PEDIATRIC
DRUG DOSES

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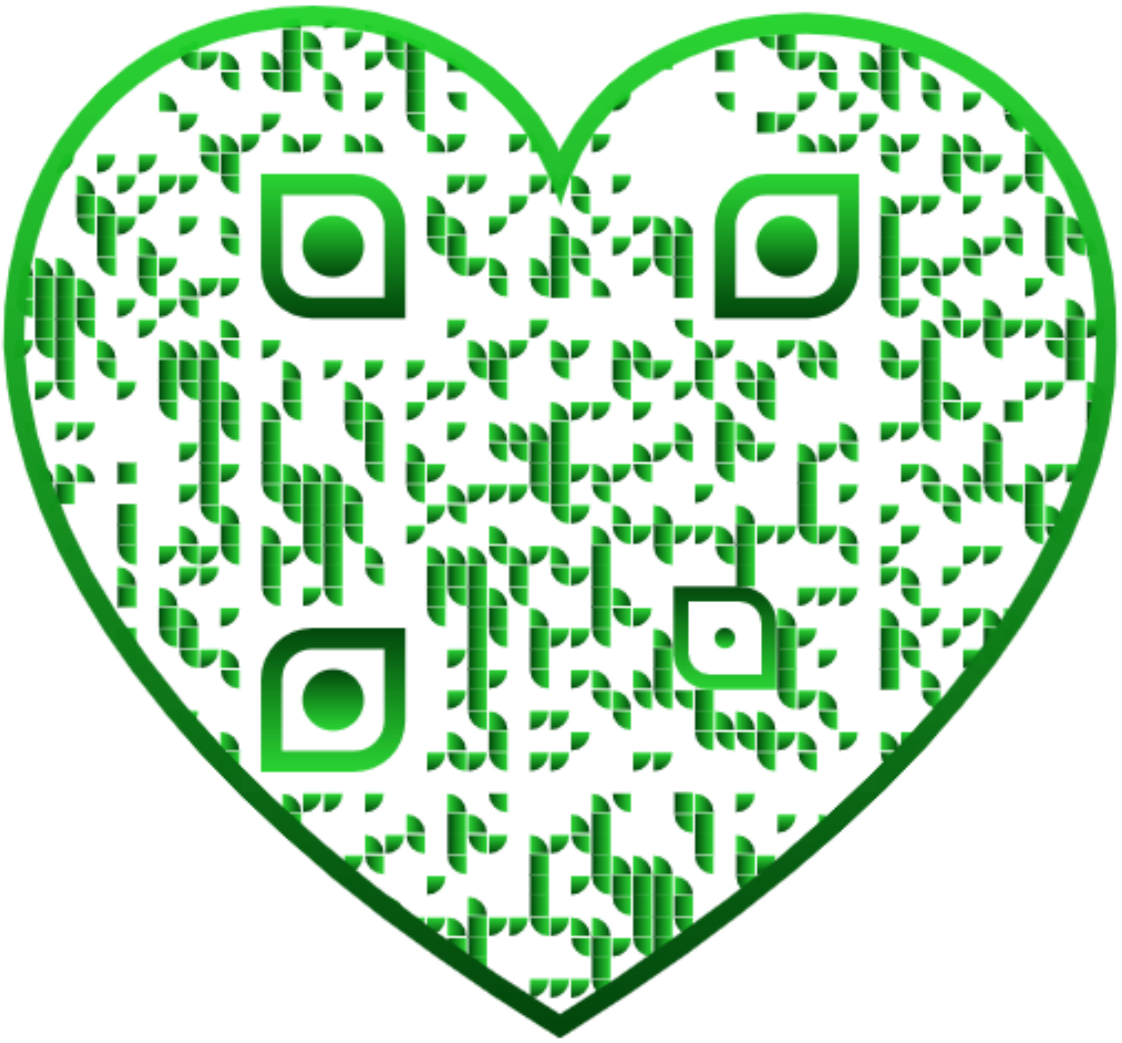

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PEDIATRIC DRUG DOSES

Second Edition

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Dedicated to

In the memory of
late (Prof) Dr VJ Rajpoot Sir (Indore),
who taught me the art of pediatrics

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Preface to the Second Edition

Welcome to this edition of the *Pediatric Drug Doses*. Tradition of this publication began in 2009. I am very thankful to all who accepted and appreciated my first edition. In this edition existing drugs are updated, few drugs are omitted and many more new drugs are added. Quick reference chart for IV medication and administering medication to children had been included which will be very helpful practically to young residents, doctors and practicing pediatricians. I have tried to retain the format of the previous edition to avoid new feeling and shall continue to enjoy the same patronage of the reading in this edition.

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Preface to the First Edition

I am pleased to have the opportunity to write this first edition of *Pediatric Drug Doses*. It is not intended to compete with the already well-established books. This book is designed to be a practical and convenient guide to the dosing and usage of medications in children.

Pediatric doses vary with the age, weight, surface area and disease, etc. Overdosing may lead to side effects and under-dosing will lead to unsatisfactory response or development of resistance in cases of antibiotics.

I did not confine myself to doses only, but expended to provide indications which is a must before knowing doses, and also included the information such as size of feeding tubes, Foley's catheters, endotracheal tubes, laryngoscope blades, oxygen mask according to age and weight; approximate weight and surface area charts; fluid resuscitation formula for burn patients; so that residents do not have to consult too many books while dealing with patients bedside. The aim is to improve the practical utility of the book.

I have made all efforts to check for any mistakes in the text and drug doses, but nobody can be perfect. If you are in any doubt about a treatment or drug doses, always check with another formulary. Due to constant research, it is advised to consult package insert especially for infrequently used drugs and drugs with narrow therapeutic index.

I have written this book for pediatric house officers and registrars particularly keeping in mind but it will also be useful for consultant practicing pediatricians.

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Acknowledgments

First of all I would like to thank my wife Rashmi and my kids Dhruv and Shlok who spare me to spend, from their share of valuable time in writing this book. She was always encouraging me to make my dream come true.

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Last but not least, I would like to thank Dr Sharad Thora, Dr Hemant Jain, Dr Mahesh Meheswari, Dr Sameer Agarwal, Dr Nivedita Kapoor for their guidance and support.

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Structure of the Book

All the drugs are listed in their respective group and are covered in short to make the book user-friendly. Drug information is presented in a consistent format and provides the following:

Generic Name: Indian adopted name.

Uses: Information pertaining to appropriate indications or use of the drug.

Usual Dosages: The amount of drug to be typically given or taken during therapy in general and in certain specific conditions. For selected drugs, the dosing adjustment in renal and/or hepatic impairment should be made accordingly.

Brand Names: Common trade names available in India.

Combinations: If any.

So, if one has reached to the final or probable diagnosis, then this book will provide the remaining information—drugs which can be prescribed, dosages, brands and forms available, and mode of administration.

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Symbols and Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
AEDs	Antiepileptic Drugs
AIDS	Acquired Immunodeficiency Syndrome
AOM	Acute Otitis Media
APTT	Activated Partial Thromboplastin Time
BA	Bronchial Asthma
BD	Twice a day
CHF	Congestive Heart Failure
CMV	Cytomegalovirus
CNS	Central Nervous System
CSF	Cerebrospinal Fluid
DCL	Diffuse Cutaneous Leishmaniasis
DM	Diabetes Mellitus
DIC	Disseminated Intravascular Coagulation
ET	Endotracheal Tube
E/E	Eye/Ear
g	Gram
G6PD	Glucose-6-Phosphate Dehydrogenase
GERD	Gastroesophageal Reflux Disease
GI	Gastrointestinal
h/hr	Hour
HSV	Herpes Simplex Virus
HT	Hypertension
ICP	Intracranial Pressure
ID	Intradermal

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IgG	Immunoglobulin-G
IM	Intramuscular
ITP	Idiopathic Thrombocytopenic Purpura
IV	Intravenous
IVH	Intraventricular Hemorrhage
IVP	Intravenous Push
JRA	Juvenile Rheumatoid Arthritis
Kg	Kilogram
LAB	Lactic Acid Bacillus
LCL	Localized Cutaneous Leishmaniasis
LMWH	Low Molecular Weight Heparin
LRTI	Lower Respiratory Tract Infection
mcg	Microgram
Mg	Milligram
Min	Minute
ML	Milliliter/Mucosal Leishmaniasis
NB	Newborn
NG	Nasogastric
NS	Normal Saline
NSAID	Nonsteroidal Anti-inflammatory Drug
OD	Once a day
OM	Otitis Media
PCM	Paracetamol
PDA	Patent Ductus Arteriosus
PNA	Postnatal Age
PO	Per Oral
PSVT	Paroxysmal Supraventricular Tachycardia
QID	Four times per day

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RDA	Recommended Daily Allowance
RTI	Respiratory Tract Infection
RDS	Respiratory Distress Syndrome
SC	Subcutaneous
SL	Sublingual
SLE	Systemic Lupus Erythematosus
SSTI	Skin and Soft Tissue Infection
TB	Tuberculosis
TDS	Thrice a day
TPN	Total Parenteral Nutrition
URTI	Upper Respiratory Tract Infection
UTI	Urinary Tract Infection
VL	Visceral Leishmaniasis
VZV	Varicella Zoster Virus
<	Less than
>	Greater than
≤	Less than or equal to
≥	Greater than or equal to

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1 CHAPTER Analgesics

ANALGESIC—NON-NARCOTIC

1. Acetylsalicylic Acid

Use: Treatment of inflammation, fever and mild to moderate pain.

Dosage: PO

- Pain and fever: 10-15 mg/kg/dose q 4-6 hr.
- Anti-inflammatory: 60-90 mg/kg/day in divided doses.
- Antiplatelet effect: 3-10 mg/kg/day, single daily dose.
- Kawasaki disease: 80-100 mg/kg/day divided q 6 hr.
- Rheumatic fever: 60-100 mg/kg/day divided q 6 hr.

Brands: Ecosprin Tab; 75, 150 and 325 mg. Delisprin Tab; 75 and 150 mg. Zosprin Tab; 100 and 150 mg.

- Contraindicated in chicken pox or if there is flu-like symptoms, hepatic failure, bleeding disorder, erosive gastritis, peptic ulcer, bronchial asthma. Discontinue the drug if hearing loss or tinnitus occurs.

2. Auranofin

Use: Management of active stage of classic or definite rheumatoid, psoriatic arthritis.

Dosage: PO; Starting 0.1 mg/kg/day in 2 divided doses. Maintenance: 0.15 mg/kg/day (Max: 0.2 mg/kg/day).

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Brands: Cap; Ridaura 3 mg, Tab; Goldar 3 mg.

- Contraindicated in blood dyscrasias, CHF, NEC, SLE, leucopenia, urticaria, etc. Stop therapy if platelet count < 100,000/mm^3, WBC < 4,000/mm^3.

3. Diclofenac Sodium

Use: Mild to moderate pain, juvenile rheumatoid arthritis.

Dosage: PO; 2-3 mg/kg/day divided q 4 hr.

Brands: 50 and 100 mg Tab; Agile, Diclofam, Diclomax.

- Also available in topical formulation as Gel; Diclonac, Nac, Voveran 1% Gel; transdermal patch, Nupatch. Contraindicated in GI bleeding, ulcer disease, aspirin triad. Use with caution in HT, BA, CHF, fluid retention, dehydration, etc.

4. Ibuprofen

Use: Fever, pain, JRA, cystic fibrosis, PDA, Migraine.

Dosage: PO

- Fever, pain: 4-10 mg/kg/dose q 6-8 hr (Max: 40 mg/kg/day).
- JRA: 30-50 mg/kg/day in 4 divided doses (Max: 2.4 gm/day).
- Cystic fibrosis: 20-30 mg/kg twice daily for 4 yr.
- PDA: IV: Initial dose of 10 mg/kg, followed at 24 hours intervals by two doses of 5 mg/kg.
- Migraine: 7.5-10 mg/kg/dose.

Brands: 100 mg/5 ml Susp; Bren, Ibugesic, Febrilix. 200 and 400 mg Tab; Brufen, Emflam, Ibugesic, Ibugin.

Combinations: Ibuprofen + Paracetamol: 400 + 325 mg Tab; Anaflam, Combiflam, Ibucin, Zupar. 100 mg + 125/5 ml

Susp; Anaflam, Zupar. 100 mg + 162.5 mg/5 ml Susp; Combiflam, Ibucin.

- Contraindicated in GI bleeding, ulcer disease, aspirin triad. Use with caution in CHF, HT, dehydration, hepatic and renal patients.

5. Indomethacin

Use: PDA closure in neonates, rheumatoid arthritis, nephrogenic diabetes insipidus.

Dosage:

- Neonates: PDA: IV; 0.2 mg/kg initially followed by 2 doses at 12-24 hours intervals.
- Rheumatoid/Inflammatory disorders: PO; 1-2 mg/kg/day in 2-4 doses (Max: 4 mg/kg/day).
- Nephrogenic diabetes insipidus: PO; 2 mg/kg/day. (For patients having inadequate response to diuretics alone may benefit from its addition).

Brands: 25 and 50 mg Cap; Artisid, Indocap, Microcid, etc.

- Contraindicated in premature neonates with NEC, impaired renal functions, IVH, bleeding, thrombocytopenia. It may decrease the antihypertensive effect of diuretics. Hold enteral feeds for 12 hours after last dose.

6. Ketorolac

Use: Treatment of ocular itch associated with seasonal allergic conjunctivitis.

Dosage: Children > 3 yr: 1 drop in eyes 4 times/day; up to 7 days.

Brands: 0.5% drop; Acular, Doloket, Ketanav, Ketodrop, etc.

Administration: Apply pressure over lacrimal sac for 2 minutes after application to avoid absorption and systemic effects.

7. Mefenamic Acid

Use: Fever, pain, rheumatoid disorders.

Dosage: PO; Should not be given for more than 7 days.

- Fever: 3 mg/kg/dose.
- Rheumatoid disorder: 10-25 mg/kg/day q 6 hr.

Brands: 100, 250 and 500 mg Tab; 100 and 50 mg/5 ml Susp; Meftal, Ponstan.

Combinations:

Mefenamic + Paracetamol: 500 + 450 mg Tab; Meftal Forte.

Mefenamic + Dicyclomine: 250 + 10 mg Tab; Meftal Spas.

8. Naproxen

Use: Fever, pain, inflammation and rheumatoid disorders.

Dosage: PO; For children > 2 yr of age.

- Pain: 5-7 mg/kg/dose q 8-12 hr.
- JRA/Inflammatory disease: 10-15 mg/kg/day in two divided doses (Max: 1000 mg/day).

Brands: 250 mg Tab; Astagen, Nalyxan, Napryn.

9. Paracetamol/Acetaminophen

Use: Mild to moderate pain and fever; Migraine. Do not have an anti-inflammatory or antirheumatic effect.

Dosage:

- Neonates: PO; rectal: 10-15 mg/kg/dose q 6-8 hr.
- Infants and children: PO; 10-15 mg/kg/dose q 4-6 hr; Rectal: 10-20 mg/kg/dose q 4-6 hr; IM: 5 mg/kg/dose.

Brands: 150 mg/ml Drops; 120 mg/5 ml Syp; 500 and 650 mg Tab; Calpol, Lanol. 80 and 170 mg Suppository; Anamol, Junimol. 150 mg/ml Inj.; Fevastin, Febrinil, Mol.

- Overdoses of paracetamol can be treated with acetylcysteine.

Combinations: Paracetamol 325 mg + Tramadol 7.5 mg; Calpol-T tablet.

10. Piroxicam

Use: Rheumatoid and inflammatory disorders.

Dosage: PO; 0.2-0.3 mg/kg/day as single dose (Max: 15 mg/kg/day).

Brands: 10 and 20 mg Tab and Cap; Brexic, Minicam, Paricam. Use with caution in infants and children.

11. Tolmetin

Use: Inflammatory and rheumatoid disorders (JRA).

Dosage: Children > 2 yr of age: PO

- Anti-inflammatory: 15-20 mg/kg/day in 3-4 divided doses (Max: 30 mg/kg/day).
- Analgesic: 5-7 mg/kg/dose q 6-8 hr.

Brands: 200 mg Tab; 400 mg Cap; Tolectin.

ANALGESIC—NARCOTIC

1. Codeine

Use: Mild to moderate pain; for nonproductive cough use in lower doses.

Dosage:

- Pain: 0.5-1 mg/kg/dose q 4-6 hr (Max: 60 mg/dose).
- Cough: 1-1.5 mg/kg/day divided q 4-6 hr (Not recommended in children < 2 yr of age).

Brands: Codeine linctus: Codeine sulphate 15 mg + Menthol 0.2 mg/5 ml. Phensedyl, Codokuff: Codeine Phosphate 10 mg + Chlorpheniramine 4 mg/5 ml. Lincotuss: Codeine Phosphate 15 mg/5 ml.

- Increase fluid and fiber intake to avoid constipation.
- Contraindicated in pre-existing respiratory illness, asthma and raised ICP. Causes constipation, nausea, anorexia, vomiting, sedation, dizziness.

2. Fentanyl

Use: Sedation, pain relief, preoperative medication, adjunct to anesthesia.

Dosage:

- Neonates and infants: IV: Intermittent doses: 1-4 mcg/kg/dose; may be repeated q 2-4 hr; continuous infusion: 0.5-5 mcg/kg/hr.
- Older infants and children: 1-12 yr: Pain: IM, IV: 1-3 mcg/kg/dose; may be repeated after 30 minutes; continuous infusion: 1-5 mcg/kg/hr.
- Children > 12 yr.: Pain: IM, IV: 0.5-1 mcg/kg/dose; may be repeated after ½ to 1 hour.
- Anesthesia: IM, IV: 2-50 mcg/kg.

Brands: 50 mcg/ml Inj; Fendrop, Fenilate, Fent, Trofentyl. Patch of 25, 50 and 100 mcg/hr, Duragesic.

Administration: For IV administer slowly over 5-10 minutes. Rapid IV infusion may cause skeletal muscle rigidity, impaired ventilation, apnea, laryngospasm.

- Contraindicated in raised ICP, severe respiratory depression, hepatic or renal problems. Physical and psychological dependence may occur with prolonged use.

3. Morphine Sulphate

Use: Pain relief; relieves dyspnea of left ventricular failure and pulmonary edema; preanesthetic medication.

Dosage:

- Neonates: IV, IM, SC: Continuous infusion: 0.01-0.03 mg/kg/hr; Intermittent dose: 0.05-0.1 mg/kg/dose q 2-4 hr.
- Infants and children: IV, IM, SC: 0.1-0.2 mg/kg/dose q 2-4 hr (Max: 15 mg/dose); PO: 0.2-0.5 mg/kg/dose q 4-6 hr.
- > 12 yr: 3-4 mg; may be repeated after 5 min as required.

Brands: 10 and 30 mg Tab; Duramor, Morcontin. 10 mg/ml Inj; Morphine Sulphate.

Administration: Administer IV over 15-30 min at a final concentration of 0.5-5 mg/ml.

- Contraindicated in respiratory depression, GI obstruction, acute or severe asthma, liver or renal problems. Neonates and infants < 3 months are more susceptible to respiratory depression.

4. Pentazocine

Use: Relief of moderate to severe pain, sedative prior to surgery.

Dosage: Efficacy and safety not confirmed below 12 yr Children > 12 yr: PO: 50 mg/dose q 3-4 hr; (Max: 600 mg/day). IV or IM dose is 1/3rd of PO dose.

Brands: 25 mg Tab; Fortwin. 30 mg/ml Inj; Fortwin, Pentawin, Susevin.

Combinations: Pentazocine + PCM: 15 + 500 mg Tab; Expergesic, Fortagesic.

5. Pethidine/Meperidine

Use: Pain, adjunct to anesthesia and preoperative sedation.

Dosage: IV, IM: 1-1.5 mg/kg/dose q 3-4 hr as needed; 1-2 mg/kg as preoperative medication single dose (Max: 100 mg/dose).

Brands: 50 mg/ml Inj; Pethidine hydrochloride.

Administration: For IV, dilute to 1-10 mg/ml and to be given over 15-30 minutes.

- Use with caution in head injury, raised ICP and in young children. Pethidine though used in combination with chlorpromazine and promethazine in lytic cocktail; this mixture may have a higher rate of adverse effects compared to alternative sedatives and analgesics.

ANALGESIC—TOPICAL

1. Benzocaine

Use: Toothache, sore throat pain, hemorrhoids, rectal fissures, minor burns, etc.

Dosage: Apply to affected area as needed. Mouth/throat, usage should not exceed 2 days.

Brand: 7.5% Gel; T-JEL.

2. Lidocaine

Use: Local anesthetic, relief of pain in postherpetic neuralgia, ventricular arrhythmias.

Dosage:

- Topical: Apply as needed but maximum dose is 3 mg/kg/dose; do not repeat within 2 hr.
- Injectable local anesthetic: As needed but maximum dose is 4.5 mg/kg/dose; do not repeat within 2 hr.
- Arrhythmias: Loading dose: 1 mg/kg; Continuous infusion 20-50 mcg/kg/minute (20 mcg/kg/minute in patients with shock, mild CHF, liver disease, cardiac arrest).
- Postherpetic neuralgia: Apply patch to affected areas (Max: 3 patch).

Brands: Gesicain, lignox: 5% Inj; 2% Jelly, 5% Ointment, 4% topical solution. Xylocaine: 1, 2 and 5% Inj; 2% Jelly, 5% Ointment, Spray, 4% Topical solution, 2% Viscous. Xylocard: 50 ml vial (1 ml = 21.3 mg), Shield Ointment.

Combinations: Shield Oint; Contains Lidocaine 3%, Hydrocortisone acetate 0.25%, Zinc oxide 5%, Allantoin 0.5%.

Administration: For IV, dilution should be 8-20 mg/ml. Lidocaine solutions containing epinephrine should not be used for treatment of arrhythmias and preservative containing solutions should not be used for IV.

ANALGESIC—URINARY

Phenazopyridine

Use: Symptomatic relief of urinary burning, frequency and urgency associated with UTI or urologic procedures.

Dosage: PO: 12 mg/kg/day divided q 8 hr.

Brands: Pyridium 200 mg Tab.

Combinations: Phenazopyridine + Nitrofurantoin: 200 + 50 mg Tab; Nephrogesic.

- It is not an antibiotic and don't treat infections. May discolor urine to orange or red.

2 CHAPTER Antiasthmatics

1. Adrenaline/Epinephrine

See under sympathomimetic.

2. Aminophylline

Use: As bronchodilator, apnea of prematurity, increase diaphragmatic contractility.

Dosage:

- Acute bronchospasm: IV; Loading dose of 6 mg/kg diluted to 1 mg/ml and infuse over 30 min followed by 0.5-1 mg/kg/hr as continuous infusion, if already on oral therapy, omit loading dose. PO; 15-20 mg/kg/day divided q 8 hr.
- Apnea of prematurity: PO, IV; Loading dose of 6 mg/kg followed by maintenance dose of 2.5-3 mg/kg/dose q 12 hr.

Brands: 100 mg Tab; 25 mg/ml Inj; Aminophylline.

- May cause seizures, tachyarrhythmias, feeding intolerance in neonates, gastroesophageal reflux, vomiting, CNS irritability. With hold dose for heart rate greater than 180 beats/min.

3. Beclomethasone

Use: Long-term control of asthma.

Dosage: Inhalation: 100 to 800 mcg/day in divided doses depending on severity.

Brands: 50, 100, 200 and 250 mcg/actuation; Beclate inhaler. 50, 100, 250 mcg/actuation; Becoride inhaler. 100 and 200 mcg rotacap; Beclate, Bevent.

Combinations: Beclomethasone + Salbutamol: 50 + 100 mcg Inhaler. 100 + 400 mcg Rotacaps; Aerocort, Vent-plus.

- To reduce chances of oral candidiasis, rinse mouth after inhalation. Use spacer device for inhalational corticosteroids in children for better lung delivery and less local toxicity.

4. Budesonide

Use: Allergic rhinitis, long-term prophylaxis and maintenance therapy of asthma.

Dosage: 100-200 mcg/day in divided doses depending upon severity. Nasal spray 2 times/day.

Brands: 0.5 and 1 mg/2 ml respule; Budate, Budecort. 100 and 200 mcg/actuation inhaler; Budecort. 100 and 200 mcg rotacaps; Budecort. 50 mcg/dose nasal spray; Pulmicort.

- Use with precautions in patient with pulmonary TB, systemic infection and ocular herpes.

5. Doxophylline

Use: Maintenance therapy in patient suffering with asthma.

Dosage: PO; > 2 yr; 12-18 mg/kg/day in single or two divided doses (Max: 200 mg BD). If nocturnal symptoms are more prefer single evening dose.

Brands: 100 mg/5 ml Syrup; 400 mg Tab; Doxoril, Doxovent, Doxobid.

- May cause N/V, dyspepsia, palpitation, tremor, insomnia.

6. Fluticasone

Use: Chronic asthma.

Dosage: Depends upon severity and systemic corticosteroids use. 100-600 mcg/day divided q 12 hr.

Brands: 0.5 mg respule; 25, 50 and 125 mcg/actuation inhaler; 50, 100 and 250 mcg rotacaps; Flohale.

- May cause oral candidiasis, change of voice, adrenal suppression, growth retardation, cataracts.

7. Formoterol

Use: Treatment and prophylaxis of asthma.

Dosage: >5 yr of age: 12 mcg twice daily 12 hr apart.

Brands: 12 mcg rotacaps and inhaler; Foratec.

Combination: Formoterol + Budesonide: 6 + 200 mcg and 6 + 400 mcg rotacaps and inhaler; Foracort, Vent-FB.

8. Ipratropium

Use: Acute and chronic asthma.

Dosage:

- Neonates: 25 mcg/kg/dose 3 times/day as nebulization.
- Infants and Children: 125-250 mcg as nebulization or 1-2 puffs 2-3 times/day.

Brands: 250 mcg/ml solution for nebulization; Ipramist, Ipravent. 20 mcg/actuation inhaler; 40 mcg rotacaps; Ipravent and Ipratop.

- May cause tachycardia, drowsiness, xerostomia, blurred vision.

9. Montelukast

Use: Prophylaxis and chronic treatment of asthma; symptomatic relief of seasonal allergic rhinitis.

Dosage: 1-5 yr: 4 mg/day; 6-14 yr: 5 mg/day; >14 yr: 10 mg/day; given as once evening dose.

Brands: 4, 5 and 10 mg Tab; Emlucast, Montair, Romilast. 4 mg granules; Montair.

- May cause palpitations, headache, elevated liver enzymes, myalgia, fatigue.

10. Salbutamol

Use: Prevention and relief of bronchospasm in asthma.

Dosage:

- Nebulization: Neonates; 0.1-0.5 mg/kg/dose or q 2-6 hr. Children; 0.15-2.5 mg/dose or q 4-6 hr (Min: 2.5 mg).
- Inhaler: 100-800 mcg/day in divided dose.
- PO; Neonates: 0.1-0.3 mg/kg/dose q 6-8 hr. Children; < 6 yr: 0.1-0.2 mg/kg/dose TDS, 6-12 yr: 2 mg/dose TDS or QID, >12 yr: 2-4 mg TDS or QID.

Brands: 2 and 4 mg Tab; 2 mg/5 ml Syrup; 100 mcg/actuation inhaler; Asthalin, Ventorlin. 2.5 mg/2.5 ml respule; Asthalin, Derihaler. 200 and 400 mcg rotacaps; Asthalin.

Combinations: Salbutamol + Beclomethasone: 100 + 50 mcg Inhaler; Aerocort, Salbair-B. 200 + 100 mcg rotacaps; Aerocort.

- May cause tachycardia, palpitation, hyperglycemia, tremor, CNS stimulation, insomnia, flushing.

11. Salmeterol

Use: Maintenance treatment of asthma.

Dosage: 25-50 mcg twice daily in children > 4 yr of age.

Brands: 25 mcg/actuation inhaler; 50 mcg rotacaps;. Serobid.

12. Sodium Cromoglycate

Use: Prophylaxis for chronic asthma, allergic rhinitis, vernal keratoconjunctivitis.

Dosage: Nebulization; 20 mg 2-3 times/day. Inhaler; 1-2 puffs 3-4 times/day. Intranasal in > 2 yr of age, 1 spray 3-4 times/day. Ophthalmic in > 4 yr of age: 1-2 drop 3-4 times/day.

Brands: 5 mg/actuation inhaler; 20 mg/2 ml respule; 20 mg rotacaps; 2% eye drop; Cromal. 1 mg/actuation; 2% eye drop; Fintal. 2.8 mg/dose nasal spray; Fintal, Cromal AQ.

13. Terbutaline

Use: Bronchodilator in asthma.

Dosage: PO; 0.05 mg/kg/dose q 8 hr (Max: 5 mg). SC: 0.005-0.01 mg/kg/dose; may be repeated in 15-20 minutes for 3 doses (Max: 0.4 mg/dose). Nebulization: 0.01-0.03 mg/kg (Min: 0.1 mg). Inhalation: 1-2 puffs q 6-8 hr.

Brands: 2.5 mg Tab; Asmaterb, Bricanyl, Brontaline. 1.5 mg/5 ml Syrup; Bricaline, Bricanyl. 0.5 mg/ml Inj; Bricanyl, Terbutaline Sulphate. 250 mcg/actuation inhaler; 10 mg/ml nebulizing solution; Bricanyl. 5ml Syrup; Dilo-BM Terbutaline Sulphate 1.25 mg; Ambroxol Hydrochloride 30 mg, Guaiphenesin 30 mg, flavored syrup base containing menthol color.

- May cause tachycardia, flushing, headache, tremor, hypokalemia, dry throat.

14. Theophylline

Use: Treatment of reversible airway obstruction due to asthma.

Dosage: PO; 6 months to 1 yr: 12-18 mg/kg/day; 1-9 yr: 20-25 mg/kg/day; 9-12 yr: 15 mg/kg/day; given divided q 8 hr.

Brands: 400 and 600 mg Tab; Odyphyllin, Phyloday, Theoday. 100 and 200 mg Tab; Theo PA. 250 mg Tab; Codiphylate. 80 mg/15 ml elixir; Broncodril.

Combinations: Theophylline + Etophylline: 115 + 35 mg and 231 + 69 mg Tab; Cordiophyllin, Deriphyllin retard. 14 + 46.5 mg/5 ml Syrup; Deriphyllin, Theotabllin.

Theophylline + Salbutamol: 200 + 4 mg Tab; 50 + 1 mg/5 ml Syrup; Theoasthacare.

- May cause tachycardia, hyperactivity, irritability, vomiting, nausea, feeding intolerance, arrhythmias, seizures.

15. Zafirlukast

Use: Prophylaxis and treatment of chronic asthma.

Dosage: 7-11 yr: 20 mg/day divided q 12 hr. Administer 1 hr before or 2 hr after meals.

Brands: 10 and 20 mg Tab; Zuvair.

3 CHAPTER

Antiarrhythmics

1. Adenosine

Use: Treatment of paroxysmal supraventricular tachycardia (PSVT).

Dosage: Neonates and Children: Initial dose of 0.05 mg/kg then increase by 0.05 mg/kg q 2 minutes until a PSVT is terminated or a maximum dose of either 0.25/kg or 12 mg is given.

Brands: 3 mg/ml Inj; Adinocor, Adenoject.

- Contraindicated in second or third degree A-V block, sick sinus syndrome. Use with caution in asthmatics, patient taking Digoxin, Verapamil. Always administer by IV site closest to the heart as administration into lower extremities may result in failure of therapy or requirement of higher doses and follow each bolus by saline flush.

2. Amiodarone

Use: Life threatening ventricular arrhythmias.

Dosage:

- PO; < 1 yr of age; 600-800 mg/1.73 m^2/day divided q 12 hr > 1 yr; 10-20 mg/kg/day divided q 12 hr for 10 days, then 5-10 mg/kg/day. Either arrhythmias are controlled or after 1-4 wk of treatment doses are reduced to half.

- IV: Loading dose of 5 mg/kg over half to one hour; may be repeated up to maximum of 15 mg/kg/day.

Brands: 100 and 200 mg Tab; 50 mg/ml Inj; Cardarone, Duron, Tachyra.

- For IV use dilute to 1.5 mg/ml in D-5%. May cause pro-arrhythmia, nightmares, behavioral changes, hyperglycemia, pneumonitis, skin color changes.

3. Atropine Sulphate

Use: Preanesthetic medication to inhibit salivation and secretions, sinus bradycardia, organophosphate poisoning, refraction testing in children, uveitis.

Dosage:

- Preanesthesia: IV, IM, SC; < 5 kg: 0.02 mg/kg/dose half an hour before then every 4-6 hr as needed. > 5 kg: 0.01-0.02 mg/kg/dose (Max: 0.4 mg/dose).
- Sinus bradycardia: Neonates and children: IV, Intratracheal; 0.02 mg/kg (Min: 0.1 mg and Max: 0.5 mg) may be repeated after 5 minutes once.
- Organophosphate poisoning: IV, IM: 0.02-0.05 mg/kg q 10-20 minutes until dry flushed skin, tachycardia, mydriasis, fever is observed then q 1-4 hr for at least 24 hr.
- Bronchospasm in children: Inhalation; 0.03-0.05 mg/kg/dose 3-4 times/day (Max: 2.5 mg/dose).

Brands: 0.6 mg/ml Inj; Atropine sulphate, Tropine. 1% drop and ointment; Atro.

- Give IV by rapid IV push as slow injection may result in paradoxical bradycardia. For intratracheal use dilute with saline to 2-5 ml then give positive pressure ventilations. Contraindicated in thyrotoxicosis, tachycardia, obstructive disease of GI tract, obstructive uropathy.

- Effective oxygenation and ventillation must precede atropine treatment of bradycardia.

4. Disopyramide

Use: Treatment of ventricular arrhythmias and atrial tachyarrhythmias.

Dosage: PO; <1 yr: 10-30 mg/kg/day divided q 6 hr 1-4 yr: 10-20 mg/kg/day divided q 6 hr 4-12 yr: 10-15 mg/kg/day divided q 6 hr.

Brands: 100 mg Tab; Regubeat 100 and 150 mg Cap; Norpace.

- Contraindicated in IInd and IIIrd degree A-V block, cardiogenic shock, avoid along with Erythromycin and Clarithromycin. May cause urinary retention, malaise, constipation, hepatic cholestasis, blurred vision, dizziness.

5. Lidocaine

See under topical analgesic.

6. Mexiletine

Use: Ventricular arrhythmias.

Dosage: PO; 1-4 mg/kg/dose q 8 hr. Start at lower doses and increase according to effect.

Brands: 50 and 150 mg Cap; 25 mg/ml Inj; Mexitil.

- Contraindicated in IInd or IIIrd degree block. May cause bradycardia, hypotension, paresthesias, blurred vision, tinnitus, convulsions.

7. Phenytoin

See under antiepileptic.

8. Procainamide

Use: Ventricular tachycardia, premature ventricular contractions, atrial fibrillation and paroxysmal atrial tachycardia.

Dosage:

- PO; 15-50 mg/kg/day divided q 3-6 hr (Max: 4g/day).
- IV: Loading dose of 3-6 mg/kg/dose to be given over 5 minutes (Max: 100 mg/dose); may be repeated q 5-10 minutes as needed to maximum of 15 mg/kg. Maintenance dose is 20-80 mcg/kg/minute (Max: 2 g/day).

Brands: 250 mg Tab; 100 mg/ml Inj; Pronestyl.

- May cause hypotension, arrhythmias, agranulocytosis, neutropenia, hepatomegaly, lupus like syndrome.

9. Propranolol

See under antihypertensive.

10. Quinidine Sulfate

Use: Supraventricular tachycardia, paroxysmal ventricular tachycardia, ventricular ectopics.

Dosage: Test dose is given in 2 mg/kg followed by dose of 30 mg/kg/day divided q 6 hr. Test dose is given for idiosyncratic reaction, intolerance, syncope, thrombocytopenia.

- May cause hypotension, heart block, bone marrow suppression, thrombocytopenia.

11. Sotalol

Use: Supraventricular and ventricular arrhythmias.

Dosage: 2-8 mg/kg/day divided q 8-12 hr.

Brands: 40 and 80 mg Tab; Sotagard.

4 CHAPTER

Antibiotics

AMINOGLYCOSIDES

Dosage adjustment in renal impairment is required. Administer other antibiotics such as penicillins and cephalosporins at least 1 hr before or after giving aminoglycosides. May cause ototoxicity, nephrotoxicity and neuromuscular blockade.

Few indications for serum concentration monitoring include:

- Treatment duration > 5 days
- Patients with impaired renal functions
- Infants < 3 months of age
- Signs of nephrotoxicity and ototoxicity
- Use of other nephrotoxic agents.

1. Amikacin

Use: Active against gram –ve bacilli, especially *E. coli*, *Klebsiella*, *Proteus*, *Enterobacter*, *Serratia*, *Pseudomonas*, *Mycobacterium tuberculosis* and *Atypical mycobacteria*.

Dosage: IV/IM:

Neonates: PNA ≤ 7d: 1200-2000 g : 7.5 mg/kg q 18-24 hrly;
> 2000 g : 10 mg/kg q 12 hrly.

PNA > 7d: 1200-2000 g : 7.5 mg/kg q 12-18 hrly;
> 2000 g : 10 mg/kg q 12 hrly.

Infants and children: 15-20 mg/kg/day divided q 8-12 hrly.

Antitubercular dose: 15-30 mg/kg/day (Max dose: 1 g).

Brands: 100, 250, 500 mg/2 ml Vial; Amicin, Amikef, Amitex, etc.

Administration: Administer IV slowly over 30 to 60 min; dilution should be 10 mg/ml.

2. Gentamicin Sulfate

Use: Active against gram-negative bacilli, specially *E. coli*, *Klebsiella*, *Proteus*, *Enterobacter*, *Serratia*, *Pseudomonas* and gram-positive *Staphylococcus*.

Dosage: IV/IM:

Neonates: PNA ≤ 7d: 1200-2000 g : 2.5 mg/kg q 12-18 hrly;
> 2000 g : 2.5 mg/kg q 12 hrly;
PNA > 7d: 1200-2000 g : 2.5 mg/kg q 8-12 hrly;
> 2000 g : 2.5 mg/kg q 8 hrly;

Infants and children : 2.5 mg/kg/dose q 8 hrly.

Intrathecal : Preservative free preparation for intraventricular or intrathecal use. Neonates: 1 mg/24 hrly. Children; 1-2 mg/24 hrly.

Topical solution: Instill 1-2 drop every 2-4 hrly, up to 2 drops/hr for severe infections.

Brands: 20, 40, 80 mg/Vial; Garamycin, Genticyn, Brogaracin, etc.

Topical: Genticyn and Garamycin eye/ear drop 0.3%

Combinations: Gentamicin + Hydrocortisone- E/E drop.

Gentamicin + Clotrimazole + Beclomethasone + Lignocaine- Ear drop.

Gentamicin + Dexamethasone-E/E drop.

Gentamicin + Beclomethasone-E/E drop.

Administration: Final concentration for IV should not exceed 10 mg/ml.

3. Kanamycin Sulfate

Use: Active against *Shigella*, *Klebsiella*, *E. coli*, *Serratia*, *Proteus*, etc. Used as anti-mycobacterial along with other agents.

Dosage: IV/IM: 15 mg/kg/day divided 12 hrly.

Antitubercular: 15-30 mg/kg/day (Max dose: 1 g).

Brands: 1 g/Vial; Kanamycin and Kancin.

4. Neomycin

Use: PO before surgery to decrease GI flora and for hyperammonemia to treat diarrhea; used topically for minor skin infections.

Dosage: PO; Infants: 50 mg/kg/day divided q 6 hrly. Children: 50-100 mg/kg/day divided q 6-8 hrly.

Preoperative bowel antisepsis: 90 mg/kg/day divided 4 hrly for 2 day. Hepatic Coma: 2.5-7 g/m^2/day divided every 4-6 hrly for 5 to 6 days, not to exceed 12 g/day.

Topical: Apply oint; 1-3 times/day.

Brands: 350 mg Cap; Neomycin Sulphate.

Combinations: Neomycin + Polymyxin-B-Eye drops.
Neomycin + Betamethasone-E/E drops.
Neomycin + Dexamethasone-E/E drops.
Neomycin + Hydrocortisone-Ear drops.

5. Netilmicin Sulfate

Dosage: IV/IM

Newborns: <1200 g, 0-4 wk : 2.5 mg/kg q 18-24 hrly;
1200-2000 g, 0-7 days : 2.5 mg/kg q 12-18 hrly;
1200-2000 g, > 7 days : 2.5 mg/kg q 8-12 hrly;
> 2000 g, 0-7 days : 2.5 mg/kg q 12 hrly;
> 2000 g, > 7 days : 2.5 mg/kg q 8 hrly;

Infants: 7.5-10 mg/kg/day/divided 8-12 hrly.

Brands: 10, 25, 50, 100, 200, 300 mg/Vial; Netilmicin and Netromycin.

6. Streptomycin

Use: Used in combination therapy of active TB and in combination with other agents for treatment of streptococcal or enterococcal endocarditis.

Dosage: IM

Neonates: 10 to 20 mg/kg/day.

Children: 20 to 40 mg/kg/day divided 12 hrly or single dose; not to exceed 1 g/day.

Brands: 0.75 g, 1 g/Vial; Ambistryn-S.

Administration: Select large muscle for IM; concentration not to exceed 500 mg/ml; rotate injection sites.

7. Tobramycin

Use: Active against gram-negative bacilli, specially *E. coli, Enterobacter*, *Klebsiella*, *Serratia*, *Proteus* and *Pseudomonas*; ophthalmic infections.

Dosage: IV/IM

Neonates: PNA < 7 days: 1200-2000 g: 2.5 mg/kg q 12-18 hrly;

> 2000 g: 2.5 mg/kg q 12 hrly;

PNA > 7 days: 1200-2000 g: 2.5 mg./kg q 8-12 hrly;

> 2000 g: 2.5 mg/kg q 8 hrly.

Children: 5 to 7.5 mg/kg/day.

0.3% Ophthalmic solution: 1-2 drops every 1 to 4 hr depending upon severity of infection.

0.3% Ophthalmic ointment: Apply 0.5" ribbon 2-3 times/day.

Brands: 20, 60, 80 mg/Vial; Tobacin, Tobasafe, Tocin.

Combinations: Tobramycin + Benzalkonium-E/E drops.

Tobramycin + Dexamethasone-E/E drops.

Administration: Final concentration should not exceed 10 mg/ml.

CARBAPENEM

1. Imipenem

Use: Active against gram-positive cocci and gram-negative bacilli including *P. aeruginosa* and anaerobes.

Dosage: Neonates: IV, IM

PNA ≤ 7 days:	< 1200 g	: 20 mg/kg divided q 18-24 hrly;
	> 1200 g	: 40 mg/kg/day divided q 12 hrly;
PNA > 7 days:	1200-2000 g	: 40 mg/kg/day divided q 12 hrly;
	> 2000 gm	: 60 mg/kg/day divided q 12 hrly.

Children: 60-100 mg/kg/day divided q 6-8 hrly.

Brands: 500 mg, 1000 mg and 1500 mg Inj; Primaxin (equivalent to 250, 500 and 750 mg respectively).

Administration: IV: Final concentration should not exceed 5 mg/ml.

- Seizures may occur when used in patients with CNS infection. Pseudomembranous colitis may occur.

2. Meropenem

Use: Active against gram-positive and gram-negative aerobic and anaerobic pathogens including *S. aureus*, *S. pneumoniae*, *H. influenzae*, *N. meningitidis*, *E. coli*, *Klebsiella,* etc.

Dosage: Neonates: IV

PNA 0-7 days:	20 mg/kg/dose q 12 hrly.
PNA > 7 days:	20 mg/kg/dose q 8-12 hrly.

Children: 60 mg/kg/day divided q 8 hrly; meningitis: 120 mg/kg/day divided q 8 hrly (Max: 6 g/day).

Brands: 500 mg and 1000 mg Inj; Meronem and Ronem.

Administration: Concentrations should not exceed 50 mg/ml.

CEPHALOSPORINS

Active against both gram-negative and gram-positive but as we move to higher generation, activity against gram-negative goes on decreasing. Probenecid may decrease their renal tubular secretion and increases serum concentration. Third generation are highly resistant to β-lactamase.

1. Cefadroxil

Use: Streptococcal pharyngitis, Tonsillitis; SSTI caused by streptococci or staphylococci, UTI caused by *Klebsiella*, *E. coli* and *Proteus mirabilis*.

Dosage: 30 mg/kg/day divided q 12 hrly PO (Max: 2 g/day).

Brands: 500 mg Cap; 125, 250, 500 mg Tab; 125 mg/5 ml Susp; Bludrox, Cefadrox, Cefadur, Droxyl, etc.

Combinations: Cefadroxil + Ambroxol, Cefadroxil + Probenecid, Cefadroxil + LAB.

2. Cefazolin

Use: Treatment of RT, SSTI, UTI, Biliary tract, bone and joint infections; and septicemia due to susceptible gram-positive cocci (except enterococcus), preoperative prophylaxis; bacterial endocarditis prophylaxis for dental and upper respiratory tract procedure.

Dosage: IV/IM

Neonates: PNA $\leq$ 7 days: 40 mg/kg/day divided q 12 hrly.

PNA $>$ 7 days : $\leq$ 2000 g: 40 mg/kg/day divided q 12 hrly.

$>$ 2000 g : 60 mg/kg/day divided q 8 hrly

Infants and children: 50-100 mg/kg/day divided q 8 hrly (Max: 6 g/day).

Bacterial endocarditis prophylaxis for dental and upper respiratory procedures in penicillin allergic patients: 25 mg/kg 30 minutes before procedure (Max: 1 g).

Brands: 250, 500, 1000 mg/Vial; Cezolin, Orizolin, Reflin.

3. Cefaclor

Use: *Staph. aureus*, *S. pneumoniae*, *H. influenzae*; treatment of otitis media, sinusitis and SSTI, bone and joint infections; UTI caused by *E. coli*, *Klebsiella* and *Proteus*.

Dosage: 20-40 mg/kg/day divided q 8-12 hrly PO; (Max: 2 g). Twice daily option is for otitis media and pharyngitis.

Brands: 250, 500 mg Cap; 125, 250 mg Tab; 125 mg/5 ml Syrup; Distaclor, Keflor.

4. Cefuroxime

Use: *Staphylococci*, *Group B Streptococci*, *Pneumococci*, *H. influenzae (type A and B)*, *E. coli*, *Enterobacter and Klebsiella*; treatment of URTI and LRTI, Otitis media, acute bacterial sinusitis, UTI, SSTI, bone and joint infection and sepsis.

Dosage: IV/IM: Neonates: 40-100 mg/kg/day divided q 12 hrly. Children: 200-240 mg/kg/day divided q 8 hrly.

PO; Infants and Children; Pharyngitis, tonsillitis: 20-30 mg/kg/day divided q 8 hrly (Max: 500 mg/day). Acute otitis media, acute bacterial sinusitis, impetigo: 30 mg/kg/day divided q 8 hrly (Max: 1 g/day).

Adolescents: Uncomplicated UTI: 125-250 mg q 12 hrly.

Uncomplicated gonorrhea: Single 1 g dose.

Brands: 125, 250, 500 mg Tab; 125 mg/5 ml Susp; 250, 750 mg/Vial; Altacef, Cetil, Zocef, etc.

Combinations: Cefuroxime + Probenecid.

Administration: ≥ 30 mg/ml for IV and should be administered over 15-30 minutes. For intravenous push administer over 3-5 minutes at a maximum concentration of 100 mg/ml.

5. Cefotaxime

Use: LRTI, SSTI, Bone and joint, Intra-abdominal and genitourinary tract infections; Meningitis due to susceptible organisms such as *H. influenzae* and *N. meningitidis*; *Neisseria gonorrhoeae,* etc.

Dosage: IM/IV

Neonates: < 1200 g: 100 mg/kg/day divided q 12 hrly. 1200-2000 g: 100-150 mg/kg/day divided q 8-12 hrly.

Infants and Children 1 month to 12 yr:

< 50 kg: 100-200 mg/kg/day divided q 6-8 hrly.

Meningitis: 200 mg/kg/day divided q 6 hrly.

≥ 50 kg: Moderate to severe infection: 1-2 g q 6-8 hrly; life-threatening infection: 2g/dose q 4 hrly (Max: dose: 12 g/day).

Brands: 125, 250, 500, 1000 mg/Vial; C-Tax, Omnicef, Taxim, Udicef.

Combinations: Cefotaxime + Sulbactam.

Administration: In a concentration ranging from 20-100 mg/ml over a period of 5-30 min. For IM 250 mg/ml.

6. Ceftriaxone

Use: Treatment of sepsis, meningitis, LRTI, SSTI, bone and joint, intra-abdominal and UTI. Active against *H. influenzae*, *Neisseria*, and *Enterobacteriaceae*; gonococcal infection or chancroid; periorbital or buccal cellulitis, salmonellosis or

shigellosis, pneumonia of unestablished etiology (< 5 yr of age), otitis media, etc.

Dosage: IM/IV

Neonates: ≤ 2000 g: 50 mg/kg/day q 24 hrly.

> 2000 g: 50 to 75 mg/kg/day q 24 hrly.

Gonococcal infection: 25-50 mg/kg/day q 24 hrly for 7 days.

Infants and children: 50-75 mg/kg/day divided q 12-24 hrly.

Meningitis: 80-100 mg/kg/day divided q 12-24 hrly; loading dose of 75 mg/kg may be administered at the start of therapy (Max: dose: 4 g/day).

Chancroid: IM, 50 mg/kg as a single dose (Max: dose: 250 mg).

Acute epididymitis: IM, 250 mg in a single dose.

Acute otitis media: 50 mg/kg in a single dose (Max 1 gm)

Brands: 125, 250, 500, 1000 g/Vial; C-Tri, Cefaxone, Monocef.

Combinations: Ceftriaxone + Sulbactam.

Administration: Use Cefotaxime in place of ceftriaxone in hyperbilirubinemic neonates. IV push over 2-4 minutes at a maximum concentration of 40 mg/ml. For IM 250 mg/ml.

7. Cefoperazone

Use: RTI, SSTI, UTI and Sepsis. Active against *E. coli*, *Klebsiella* and *Haemophilus* but variable activity against Streptococcus and Staphylococcus species.

Dosage: IV/IM: Neonates: 100 mg/kg/day divided q 12 hrly. Children: 100-150 mg/kg/day divided q 12 hrly (Max: 12 g/day).

Brands: 250, 500, 1000 mg/Vial; Magnamycin, Myticef.

Combinations: Cefoperazone + Sulbactam.

Administration: For IM ≥ 250 mg/ml and IV 5-50 mg/ml over 30 min.

- Concomitant use of anticoagulants may increase the risk of severe hemorrhage. Cefoperazone may decrease vitamin k synthesis by suppressing GI flora and Vitamin 'K' deficiency may occur.

8. Ceftazidime

Use: RTI, UTI, SSTI, intra-abdominal, osteomyelitis, sepsis and meningitis caused by *Enterobacteriaceae* and *Pseudomonas*; empirical therapy for febrile, agranulocytopenic patients.

Dosage: IM/IV.

Neonates: 1200-2000 g: 100 mg/kg/day divided q 12 hrly.

> 2000 gm: 150 mg/kg/day divided q 8 hrly.

Infants and Children: 100-150 mg/kg/day divided q 8 hrly.

Meningitis: 150 mg/kg/day divided q 8 hrly (Max: 6 g/day).

Brands: 250, 500, 1000 mg/Vial; C-zid, Tizime, Zidime.

Administration: For IM ≥ 300 mg/ml and for IV 40-180 mg/ml.

9. Cefdinir

Use: Respiratory tract, SSTI, and OM; susceptible organisms are *S. pneumoniae*, *H. influenzae*, *M. catarrhalis* and *S. aureus*, etc.

Dosage: PO; ≥ 6 months-12 yr: 14 mg/kg/day divided q 12 hrly for 5-10 days in OM, pharyngitis/tonsillitis, SSTI, acute maxillary sinusitis (Max: 600 mg/day).

Brands: 125 mg Tab; 300 mg Cap; 125 mg/5 ml Susp; Aldinir, Rtist, Sefdin.

- Administer with food, administer at least 2 hrly before or after antacids or iron supplements (as they decrease absorption by 40 and 80% respectively).

10. Cefepime

Use: LRTI, SSTI, UTI by various gram-positive and gram-negative organisms.

Dosage: IV/IM: 100-150 mg/kg/day divided q 8-12 hrly.

Brands: 500 mg, 1 and 2 gm/Vial; Cepime, kefage, Novapime.

Administration: 40-100 mg/ml for IV and 300 mg/ml for IM.

- Not compatible with metronidazole, vancomycin, aminoglycosides and aminophylline.

11. Cefixime

Use: UTI, OM, RTI; Susceptible organisms are *Streptococcus*, *H. influenzae*, *M. catarrhalis*, *N. gonorrhoeae*, etc.

Dosage: PO; 8 mg/kg/day divided q 12 hrly (Max: 400 mg/day). Enteric fever: 20 mg/kg/day q 12 hrly for 7 days. Shigellosis: 8 mg/kg/day q 12 hrly for 5 days. UTI: 16 mg/kg/day q 12 hrly on day 1, then 8 mg/kg/day for 13 days.

Brands: 100, 200 mg Tab; 50 mg/5 ml Susp; Cefi, Cefspan, Extacef, Fixx.

- Cefixime may increase warfarin (increase PT) and carbamazepine levels.

12. Cefpodoxime

Use: Pneumonia, Uncomplicated gonorrhea, SSTI, AOM, Pharyngitis, Tonsillitis, UTI; active against *S. aureus*, *Streptococcus*, *H. influenzae*, *N. gonorrhoeae*, *E. coli*, *Klebsiella* and *Proteus*.

Dosage: PO; 10 mg/kg/day divided q 12 hrly (Max: 400 mg/day), Uncomplicated gonorrhea: 200 mg single dose.

Brands: 50, 100, 200 mg Tab; 50 and 100 mg/5ml Susp; Cepodem, Doxcef, Monocef-O.

- Serum levels and absorption is reduced by antacids and H_2-receptor antagonists.

13. Cefprozil

Use: RTI, SSTI, OM; active against *S. aureus*, *Streptococcus*, *H. influenzae*, *E. coli*, *Klebsiella* and *Proteus*.

Dosage: PO; 30 mg/kg/day divided q 8-12 hrly (Max: 1 gm/day). Pharyngitis/tonsillitis: 15 mg/kg/day q 12 hrly. SSTI: 20 mg/kg once daily.

Brands: 250, 500 mg Tab; Refzil-O, Zemetril. 125, 250 mg/5 ml Susp; Refzil-O.

14. Ceftizoxime

Use: UTI, SSTI, RTI, Sepsis; active against gram-positive and gram-negative infections.

Dosage: IV/IM: $\geq$ 6 months and Children: 30-60 mg/kg/day q 6-8 hrly. In severe infections up to 100-150 mg/kg/day.

Brands: 250 mg, 1 gm/Vial; Cefizox, Eldcef.

Administration: 50 mg/ml for IV

- Sodium content of 1 gm ceftizoxime: 60 mg (2.6 mEq).

15. Cefpirome

Use: Gram-positive, active against *Pseudomonas*, *Staphylococci*, *Enterococcus*; UTI, LRTI, SSTI, Septicemia, etc.

Dosage: IV/IM: 30-60 mg/kg/day divided q 12 hrly.

Brands: 250, 500 mg Tab; Refzil-O, Zemetril. 125, 250 mg/5 ml Susp; Refzil-O.

16. Cephalexin

Use: *Group A-β-haemolytic Streptococcus*, *Staphylococcus, Klebsiella pneumonia, E. coli* and *Proteus*. Used to treat RT, SSTI, Bone and Joint, Genitourinary and Otitis media.

Dosage: PO: 25-100 mg/kg/day divided q 6-8 hrly (Max: 4 g/day).

Brands: 250 and 500 mg Cap; 125 and 250 mg Tab; 125 and 250 mg/5 ml Susp; 100 mg/ml Drops; Ceff, Nufex, Phexin, Sporidex.

LINCOSAMIDES

1. Clindamycin

Use: Active against aerobic gram-positive *Staphylococci* and *Streptococci*; *Fusobacterium*, *Bacteroids* and *Actinomyces*. Topically for acne vulgaris.

Dosage: PO; 10-30 mg/kg/day divided q 6 hrly (Max: 1.8 g/day).

IV/IM: 25-40 mg/kg/day divided q 6-8 hrly (Max: 4.8 g/day).

Brands: 150 mg, 300 mg Cap.; 50 mg/ml Inj; Clinan, Dalacin C. 1% Cream; Acnecin, Mimosee.

2. Lincomycin

Use: URTI and osteomyelitis. Topically for acne vulgaris.

Dosage: PO: 30-60 mg/kg/day divided q 8 hrly. IV/IM: 10-20 mg/kg/day divided q 8-12 hrly.

Brands: 250 mg, 500 mg Cap; 125 mg/5 ml Syp; 300 mg/ml Inj; Lycin and lynx 2% Gel; Link and Lynx.

MACROLIDES

1. Azithromycin

Use: Mild to moderate URTI and LRTI, Pneumonia, SSTI, AOM, Urethritis and Cervicitis due to susceptible strains of *C. trachomatis*, *N. gonorrhoeae*, *M. catarrhalis*, *H. influenzae*, *S. aureus*, *S. pneumoniae*, *Mycoplasma*, *Streptococcus* and *Legionella*; endocarditis prophylaxis, *Salmonella*.

Dosage: PO/IV:

Children > 6 months: RTI: 10 mg/kg on day 1 (Max: 500 mg/day) followed by 5 mg/kg/day once daily for 5 days (Max: 250 mg/day). Otitis Media: 10 mg/kg once daily for 3 days (Max: 500 mg/day) or 10 mg/kg on day 1, followed by 5 mg/kg once daily for 2-5 days ≥ 2 years: Pharyngitis, tonsillitis: 12 mg/kg once daily for 5 days (Max: 500 mg/day). Chancroid: Single dose of 20 mg/kg (Max: 1 g). Uncomplicated chlamydial trachomatis: Single dose of 20 mg/kg (Max: 1 g). Endocarditis prophylaxis: 15 mg/kg/dose 1 hr before procedure. Typhoid: 20 mg/kg/day.

Brands: 100, 250, 500 mg Tab; 100, 200 mg/5 ml Susp; ATM, Azithral, Zithrocin. 500 mg Inj; Azithral.

Combinations: Azithromycin + Ambroxol.

Administration: Administer IV at a final concentration of 1 mg to 2 mg/ml over 1 to 3 hr.

2. Clarithromycin

Use: URTI, LRTI, AOM, SSTI due to susceptible strains of *S. aureus*, *S. pyogenes*, *S. pneumoniae*, *H. influenzae*, *M. catarrhalis*, *Mycoplasma pneumoniae*, *C. trachomatis* and *Legionella species*; treatment of *H. pylori* infection; prophylaxis of bacterial endocarditis in penicillin allergic patients.

Dosage: PO

- Infants and Children: AOM: 15 mg/kg/day divided q 12 hrly for 10 days. Respiratory, SSTI: 15 mg/kg/day divided 12 hrly for 7-14 days. Prophylaxis for bacterial endocarditis: 15 mg/kg 1 hrly before procedure.
- Adolescents: *H. pylori* (Combination therapy with omeprazole or with bismuth subsalicylate, tetracycline and H_2-receptor antagonist): 250 mg twice, up to 500 mg 3 times/day.

Brands: 125, 250, 500 mg Tab; 125 mg/5 ml Syrup; Clarie, Crixan, Maclar.

- Concomitant use with terfenadine, astemizole, cisapride may result in QT interval prolongation, tachycardia, hypotension. Safety not established below 6 month of age. Clarithromycin increases serum levels of theophylline, carbamazepine, digoxin, cisapride.

3. Erythromycin

Use: URTI, LRTI, pharyngitis, skin infections due to *streptococci* and *staphylococci*; *mycoplasma*, *Legionella*, *Diphtheria*, *Pertussis*, *Cholera*, *acne*, *chancroid*; to improve feeding intolerance in preterm infants.

Dosage: PO:

Neonate: $\leq$ 7 days: 20 mg/kg/day divided q 12 hrly > 7 days: 30-40 mg/kg/day divided q 6-8 hrly. Chlamydial pneumonia: 50 mg/kg/day divided q 6 hrly for 14 days.

Infants and Children: 30-50 mg/kg/day divided q 6-8 hrly (Max: 2g/day).

Chlamydial trachomatis: 50 mg/kg/day divided q 6 hrly for 10-14 days.

Feeding Intolerance: 5 mg/kg/dose q 6 hrly.

Cholera: 40 mg/kg/day along with other antimicrobials.

Diphtheria: 40-50 mg/kg/day along with antitoxin therapy for 14 days.

Pertussis: 40-50 mg/kg/day for 14 days.

Rheumatic fever prophylaxis: 250 mg twice daily in penicillin allergic patients.

Brands: 125, 250 mg Tab; 125 mg/5ml Syp; Althrocin, Erythrocin. 3% Erytop cream and lotion for topical application in Acne.

Combinations: Erythromycin + Bromhexine.

- Erythromycin decreases clearance of carbamazepine, cisapride, theophylline, digoxin and may lead to their toxicity (do not use it concurrently). Avoid milk and acidic beverages 1 hr before or after a dose; administer after food to decrease GI discomfort.

4. Roxithromycin

Use: Respiratory, ENT, SSTI, genital tract infection caused by *Staphylococcus*, *Streptococcus*, *Corynebacterium*, *Listeria*, *Legionella*, *Mycoplasma*.

Dosage: 5-8 mg/kg/day in divided doses 12 hrly.

Brands: 50, 150 Tab; 50 mg/5 ml Syrup; Arbid, Roxid, Roximal.

Combinations: Roxithromycin + Ambroxol.

PENICILLINS

1. Amoxicillin

Use: Active against *Salmonella*, *Shigella*, *Neisseria*, *E. coli*, *P. mirabilis*, *H. influenzae*. Used to treat OM, Sinusitis, RTI, Enteric fever, etc.

Dosage: PO; Neonates: 20-30 mg/kg/day divided q 12 hrly.

Infants and Children: 20-50 mg/kg/day divided q 8-12 hrly.

AOM: 80-90 mg/kg/day.

Endocarditis prophylaxis: 50 mg/kg 1 hr before procedure.

Enteric fever: 100 mg/kg/day for 14 days.

Brands: 125 and 250 mg Tab; 250 and 500 mg Cap; 125 mg/5 ml Syrup; 100 mg/ml drops; Novamox, Mox, Lamoxy, etc.

Combinations: Amoxicillin + Cloxacillin, Amoxicillin + LAB

2. Amoxicillin + Clavulanic Acid

Use: Same as amoxicillin in addition β-lactamase producing *M. catarrhalis*, *H. influenzae*, *Niesseria* and *S. aureus*, *Klebsiella*, etc.

Dosage: (Amoxycillin base)

Neonates: 30 mg/kg/day divided q 12 hrly. PO.

Infants and Children: 20-45 mg/kg/day divided q 8-12 hrly. PO; 50-100 mg/kg/day divided q 6-8 hrly IV.

Brands: 228.5 mg (200 + 28.5 mg), 375 mg (250 + 125 mg) and 625 mg (500 + 125 mg) Tab; 228.5 mg (200 + 28.5 mg) and 157.2 mg (125 + 32.2 mg) Susp; 150 mg (125 + 25 mg), 300 mg (250 + 50 mg), 600 mg (500 + 100 mg), 1200 mg (1 gm + 200 mg) Inj; Augmentin, Clavam.

3. Ampicillin

Use: Active against *Streptococci*, *Pneumococci*, *Enterococci*, some strains of *H. influenzae*, *Salmonella*, *Shigella*, *E. coli* and *Klebsiella*.

Dosage: IV/IM: Neonates (Use two times the recommended doses for meningitis).

PNA ≤ 7d: ≤ 2000 gm: 50 mg/kg/day divided q 12 hrly.

> 2000 gm: 75 mg/kg/day divided q 8 hrly.

PNA > 7 d: ≤ 2000 gm: 75 mg/kg/day divided q 8 hrly.

> 2000 gm: 100 mg/kg/day divided q 6 hrly.

Infants and Children: 100-200 mg/kg/day divided q 6 hrly. (For meningitis use twice the usual doses) Max: 12 g/day.

Endocarditis prophylaxis: 50 mg/kg 30 min before procedure (Max: 2 gm).

Brands: 125 mg and 250 mg Tab; 250 and 500 mg Cap; 125 mg/5 ml Susp; 100 mg/ml Drops; 250 and 500 mg Inj; Ampillin, Aristocillin, Brodicillin, Roscillin.

Combinations: Ampicillin + LAB, Ampicillin + Cloxacillin, Ampicillin + Sulbactum.

Administration: For IV 30-100 mg/ml and can be given over 15-30 min. Do not give simultaneously with aminoglycosides.

4. Ampicillin + Sulbactam

Use: Addition of sulbactam enhances activity against penicillinase producing bacteria, i.e. *S. aureus*, *Streptococcus*, *H. influenzae*, *E. coli*, *Klebsiella*, *B. fragilis*.

Dosage: Based on ampicillin component: IV/IM:

Infants > 1 mth: 100-150 mg/kg/day divided q 6 hrly.

Children: 100-200 mg/kg/day divided q 6 hrly.

Brands: Ampicillin 1 gm + Sulbactum 0.5 gm/Vial; Ampitum, Betamp, Sulbacin.

5. Carbenicillin

Use: Active against susceptible strains of *P. aeruginosa*, *E. coli*, *Indole positive Proteus* and *Enterobacter*.

Dosage: IV/IM:

Neonates:

PNA ≤ 7 days: < 2000 g: 225 mg/kg/day divided q 8 hrly.

> 2000 g: 300 mg/kg/day divided q 6 hrly.

PNA > 7 days: 300-400 mg/kg/day divided q 6 hrly.

Children: 400-600 mg/kg/day divided q 4-6 hrly.

Brands: 1 and 5 g/Vial; Carbelin, Pyoper.

6. Cloxacillin

Use: Active against penicillinase resistant *S. aureus* and other gram-positive cocci except *Enterococcus* and coagulase negative *Staphylococci*.

Dosage: IV/PO; Children > 1 month: 50-100 mg/kg/day divided q 6 hrly (Max: 4 g/day).

Brands: 125 mg/5 ml Syrup; 250 and 500 mg Cap; 250 and 500 mg Inj; Biodox, Clocilin, klox.

Combinations: Cloxacillin + Ampicillin

Cloxacillin + Ampicillin+ LAB.

7. Penicillin G Aqueous (Crystalline Penicillin)

Use: Active against most gram-positive cocci except *S. aureus*, some *gram-negative* organisms such as *N. gonorrhoeae*, *N. meningitidis* and some anaerobes and Spirochetes.

Dosage: IV/IM:

Neonates: For meningitis use twice the usual doses.

PNA ≤ 7 days: 1.2-2 kg: 50,000 units/kg/day divided 12 hrly.

> 2 kg: 75,000 units/kg/day divided 8 hrly.

PNA > 7 days: 1.2-2 kg: 75,000 units/kg/day divided 8 hrly.

> 2 kg: 100,000 - units/kg/day divided 6 hrly.

Children: 100,000-250,000 units/kg/day divided 4-6 hrly (Max: 400,000 units/kg/day). Rheumatic fever prophylaxis and pneumococcal infections: 200,000 units BD.

Brands: Penicillin G sodium 5 lac and 10 lac units/Vial; Benzyl penicillin. Penicillin G potassium 2, 4 and 8 lac units Tab; Pentids.

Administration: For IV 100,000-500,000 units/ml and should be given over 30-60 min. For neonates, it is 50,000 units/ml. Don't administer orally along with meals.

- Use with caution in pre-existing seizure disorder. Penicillin G potassium content is 1.7 mEq/million units. Penicillin G sodium content is 2 mEq/million units.

8. Penicillin G Benzathine

Use: Useful for treatment of infections responsive to persistent, low concentration of penicillin, e.g. Streptococcus pharyngitis, rheumatic fever prophylaxis.

Dosage: IM: Neonates: > 1.2 kg: 50,000 units/kg once.

Children: 300,000-1.2 million units/kg q 3-4 wk (Max: 1.2-2.4 million units/dose).

Secondary rheumatic fever prophylaxis:

< 6 yr: 6 lac units q 3 wk, > 6 yr: 12 lac units q 3 wk.

Brands: 6, 12 and 24 lac units/Vial; Longacillin, Penidura.

Administration: Do not give at the same site repeatedly as it may cause fibrosis and atrophy.

- Use penicillin G benzathine and penicillin G procaine combination to achieve early peak levels in acute infections.

9. Penicillin G Procaine

Use: Active against *T. pallidum* and organisms susceptible to low but prolonged serum levels.

Dosage: IM: Neonates: > 1.2 kg: 50,000 units/kg/day once (Avoid in this age group as sterile abscesses and procaine toxicity may occur).

Children: 25,000-50,000 units/kg/day divided q 12-24 hrly (Max: 4.8 million units/day).

Brands: Inj; Procaine penicillin 4,00,000 units/Vial.

10. Penicillin V Potassium

Use: Active against most gram-positive cocci; *S. pneumoniae*, *Streptococcus*, and some gram-negative bacteria *N. gonorrhoeae*, *N. meningitidis*.

Dosage: PO: Children: < 12 yr: 25-50 mg/kg/day divided q 6-8 hrly (Max: 3 g/day), > 12 yr: 125-500 mg q 6-8 hrly.

Primary prevention of rheumatic fever: 250 mg 2-3 times/day for 10 days.

Prophylaxis of pneumococcal infections in children with sickle cell disease: < 3 yr: 125 mg BD, > 3 yr: 250 mg BD.

Brands: 125 and 250 mg Tab; Kaypen.

- Use with caution in patients with history of seizures. Each 250 mg penicillin V. contain 0.7 mEq of potassium. Each 250 mg = 400,000 units of penicillin.

11. Piperacillin

Use: Active against *P. aeruginosa*, *E. coli*, *Serratia*, Enterobacter and Bacteroids.

Dosage: IV/IM:

Neonates: PNA < 7 d: 150 mg/kg/day divided q 8-12 hrly. ≥ 7 d: 200 mg/kg/day divided q 6-8 hrly.

Children: 200-300 mg/kg/day divided q 4-6 hrly.

Brands: 1 and 2 g/Vial; Pipralin, Piprapen.

Administration: For IV, 200 mg/ml can be given over 3-5 minutes.

- Sodium content of 1 g = 1.85 mEq.

12. Piperacillin + Tazobactam

Use: Tazobactam expands activity of piperacillin to B-Lactamase producing strains of *S. aureus*, *H. influenzae*, *B. fragilis*, *E. coli* and *Acinetobacter*.

Dosage: Based on piperacillin component.

Infants ≤ 6 mth: 150-300 mg/kg/day divided q 6-8 hrly.

Infants and Children > 6 mth: 300-400 mg/kg/day divided q 6-8 hrly.

Brands: Available in 8:1 combination. 2.25 g (2 g + 250 mg) and 4.5 g (4 g + 500 mg) Inj; Piptaz, Tazact, Torbac.

Administration: Can be given over 30 minutes at a maximum concentration of 200 mg/ml.

13. Ticarcillin

Use: Extended spectrum molecule active against *E. coli*, *Enterobacter*, *P. aeruginosa* and *Bacteroides*.

Dosage: IV:

Neonates: < 2 kg: 150 mg/kg/day divided q 12 hrly.

> 2 kg: 225 mg/kg/day divided q 8-12 hrly.

Infants and Children: 200-300 mg/kg/day divided 4-6 hrly.

Brands: 3 and 5 gm/Vial; Ticar.

Combinations: Ticarcillin + Clavulanate.

Administration: Can be given IV at a maximum 100 mg/ml concentration over 30 minutes.

- Use with caution in patients with CHF due to high sodium content (1 g contain 5.2-6.5 mEq).

QUINOLONES

1. Ciprofloxacin

Use: Active against *Shigella*, *Salmonella*, *Neisseria*, *P. aeruginosa*, *Enterobacter*, *H. influenzae*, *S. aureus*, *Streptococcus*. Topically for corneal ulcers and conjunctivitis.

Dosage: PO; IV: Children: 15-30 mg/kg/day divided 12 hrly (Max: PO; 1.5 gm/day IV; 800 mg/day).

Brands: 250, 500, 750 mg Tab; 2 mg/ml Infusion; Alcipro, Cebran, Cifran, Ciplox.

Combinations: Ciprofloxacin + Ornidazole: PO.

Ciprofloxacin + Tinidazole: PO.

Ciprofloxacin + Benzalkonium: Eye drops.

Ciprofloxacin + Dexamethasone: E/E drops.

Administration: For IV it can be given over 30 mins at a maximum concentration of 2 mg/ml.

- Use with caution in patients with seizures and renal problems. Avoid use along with dairy products, mineral supplements and antacids.

2. Gatifloxacin

Use: Active against gram-positive, gram-negative pathogens; some anaerobes and atypical mycobacteria.

Dosage: 10 mg/kg/day single dose orally.

Brands: 200, 400 mg Tab; Gaity, Gatiquin, Zigat.

Combinations: Gatifloxacin + Ornidazole: PO.

Gatifloxacin + Dexamethasone: Eye drops.

3. Levofloxacin

Use: UTI, Pneumonia, Otitis media, SSTI.

Dosage: PO; IV (Max dose: 500 mg/day).

- 6 mth to < 5 yr: 10 mg/kg/dose twice daily.
- 5-12 yr: 10 mg/kg/dose twice daily.

Brands: 250, 500 mg Tab; 500 mg/ml Inj; Glevo, L-cin, Levobact.

- Give IV over 1½ hr, rapid infusion may cause hypotension. Use with caution is diabetes, seizures, children < 18 yr.

4. Nalidixic Acid

Use: Lower UTI caused by *E. coli*, *Enterobacter*, *Klebsiella* and *Proteus*.

Dosage: PO; Children: > 3 mth: 50-55 mg/kg/day divided q 6 hrly.

Prophylaxis of UTI: 25-30 mg/kg/day divided q 8 hrly.

Brands: 250, 500 mg Tab; 300 mg/5 ml Syrup; Dix and Gramoneg.

5. Norfloxacin

Use: Primarily used for urinary and genital tract infections and bacterial diarrheas. Topically for eye and ear infections.

Dosage: PO; 6-12 mg/kg/day divided q 12 hrly.

Brands: 100, 200, 400 mg Tab; Norbactin, Norbid, Utibid. 100 mg/5 ml Susp; Tamflox, Wyflox.

Combinations: Norfloxacin + Tinidazole. PO
Norfloxacin + Metronidazole. PO

6. Ofloxacin

Use: Active against gram-positive, anaerobes and chlamydia. Useful for corneal ulcers, conjunctivitis, otitis externa and CSOM.

Dosage: PO; 15 mg/kg/day divided q 12 hrly.

IV: 5-10 mg/kg/day divided q 12 hrly.

Brands: 200 and 400 mg Tab; 50 mg/5 ml Susp; 2 mg/ml Infusion; Bioff, Oflox, Zanocin, Zenflox, etc.

Combinations: Ofloxacin + Metronidazole. PO
Ofloxacin + Ornidazole. PO
Ofloxacin + Tinidazole. PO
Ofloxacin + Dexamethasone-Ear drops.

TETRACYCLINES

1. Doxycycline

Use: Active against gram-positive cocci except *Enterococcus*, many gram-negative bacilli, anaerobes, *Mycoplasma* and *Chlamydia*.

Dosage: PO: 2-5 mg/kg/day divided q 12-24 hrly (Max: 200 mg/day). Cholera: 5 mg/kg single dose.

Brands: 100 and 200 mg Tab; Doxy-1, Vibazine

- Contraindicated in children < 8 yr due to associated retardation in skeletal development, permanent discoloration of teeth and enamel hypoplasia. Administration along with iron, calcium and milk decreases its absorption.

2. Minocycline

Dosage: 4 mg/kg/day divided q 12 hrly.

Brands: 50 mg, 100 mg Tab; CNN and Minolin.

- Avoid in children < 8 yr of age as for Doxycycline.

3. Tetracycline

Use: Treatment of rocky mountain spotted fever, acne vulgaris, lyme disease and mycoplasma disease.

Dosage: 25-50 mg/kg/day divided q 6 hrly (Max: 3 g/day).

Brands: 250 mg, 500 mg Cap; Hostacycline, Subamycin, Tetracycline.

- Contraindication as for Doxycycline. Administer 1 hrly. before or 2 hrly after meals.

MISCELLANEOUS ANTIMICROBIALS

1. Aztreonam

Use: UTI, LRTI, Septicemia, SSTI, etc. Active against gram-negative aerobic bacteria, *Enterobacteriaceae*, *Pseudomonas*, *H. influenzae*, etc.

Dosage: IV/IM.

Neonates:

PNA ≤ 7 days: ≤ 2000 g: 60 mg/kg/day divided q 12 hrly.

> 2000 g: 90 mg/kg/day divided q 8 hrly.

PNA > 7 days: ≤ 2000 g: 90 mg/kg/day divided q 8 hrly.

> 2000 g: 120 mg/kg/day divided q 6-8 hrly.

Children: 90-120 mg/kg/day divided q 6-8 hrly.

Brands: 0.5, 1 and 2 g/Vial; Azenam, Aztreo.

Administration: For IV 20-60 mg/ml; can be given over 10-60 min.

- Probenecid and furosemide increases serum levels.

2. Chloramphenicol

Use: Active against *Bacteroides*, *H. influenzae*, *N. meningitidis*, *S. pneumoniae*, *Salmonella*, *Mycoplasma,* etc. Topically for conjunctivitis and otitis externa.

Dosage: Infants and Children: 50-75 mg/kg/day divided q 6 hrly IV or PO. Meningitis: IV; Infants and Children: 75-100 mg/kg/day divided 6 hrly.

Brands: 250, 500 mg Cap; 125 mg/5 ml Susp; 1 gm/Vial; Enteromycetin, Paraxin.

Combinations: Chloramphenicol + Betamethasone-E/E drops.

Chloramphenicol + Dexamethasone-E/E drops.

Chloramphenicol + Polymyxin-E/E drops.

Chloramphenicol + Sulphacetamide-Eye drops.

- Three major toxicities are: Aplastic anemia, Bone marrow suppression and Grey baby Syndrome. Rifampicin, phenytoin and phenobarbitone may decrease serum levels. Use with caution in G6PD deficiency. May decrease absorption of vitamin B_{12}.

3. Colistin Sulfate

Use: For gram-negative bacillary diarrhea and pseudomonal enteritis.

Dosage: 5-15 mg/kg/day divided q 6-8 hrly. PO.

Brands: 12.5 mg/5 ml, 25 mg/5 ml Susp; Colistop, Gdsafe, Furoxone Suspension/Tablets, Walamycin.

Combination: Furazolidone IP 25 mg/5 ml, Furazolidone IP 100 mg

4. Furazolidone

Use: For enteritis and protozoal diarrhea; active against *salmonella*, *shigella*, *giardia*, etc.

Dosage: Infants >1 mth and children: PO; 5-9 mg/kg/day; divided q 6 hrly (Max: 400 mg).

Brands: 25 mg/5 ml Syp; 100 mg Tab; Furoxone.

- Avoid in G6PD deficiency. Use in infants < 1 mth may cause hemolytic anemia.Urine color is changed to orange during its use.

5. Linezolid

Use: Treatment of pneumonia, SSTI, bacteremia caused by vancomycin resistant *Enterococcus*, *Streptococcus pneumoniae*, *Staph. aureus*, etc.

Dosage: Infants and Children: IV or PO; 10 mg/kg/dose q 8-12 hrly.

Brands: 600 mg Tab; 2 mg/ml infusion; Linox, Lizolid, Lizomed.

Administration: For IV: Infuse over 30-120 mth.

- May cause pseudomembranous colitis and myelosuppression.

6. Nitrofurantoin

Use: Prevention and treatment of UTI caused by *E. coli*, *Klebsiella*, *Enterobacter*, *S. aureus*, etc.

Dosage: Infants> 1 month and Children: 5-7 mg/kg/day divided q 6 hrly (Max: 400 mg/day). UTI prophylaxis: 1-2.5 mg/kg/day single dose (Max: 100 mg/day).

Brands: 50 mg, 100 mg Tab; 25 mg/5 ml Susp; Furadantin.

- Should not be used to treat UTI in febrile infants and young children in whom renal involvement is likely. Use with caution in anemia, G6PD and Vitamin B deficiency, DM, etc.

7. Polymyxin-B Sulfate

Use: Treatment of otitis externa. Rarely used parenteral for enteral and systemic infections.

Dosage: PO; 50,000 to 1,50,000 units/kg/day divided q 6-8 hrly. IV/IM: 15,000 - 25,000 units/kg/day divided q 12 hrly (Max: 2,000,000 units/day). Topical: 0.1 to 0.3% solution.

Brands: 5 lac iu/Vial; Aerosporin.

Combinations: Neosporin power (Polymyxin 5000 U + Bacitracin 400 U + Neomycin 3400 U/gm), Neosporin oint (Polymycin 5000 U + Bacitracin 400 U + Neomycin 3400 U/gm), Neosporin-H oint (same as Neosporin oint + Hydrocortisone 10 mg/gm), Neosporin eyedrop (Polymyxin 5000 U + Neomycin 1700 U + Gramicidin 25 U/ml), Neomycin-H ear drop (Polymixin 10,000 U + Neomycin 3400 U + Hydrocortisone 10 mg/ml).

Administration: Infuse slowly at a concentration of 1000-1600 units/ml.

- 1 mg of Polymyxin B = 10,000 units. IM route is not recommended due to severe pain.

8. Teicoplanin

Use: Active against gram-positive organisms only (Staphylococci, Streptococci and Enterococci).

Dosage: IM/IV: 10 mg/kg 12 hrly. For 3 doses followed by 6-10 mg/kg/day.

Brands: 200 mg and 400 mg/Vial; Targocid and Ticocin.

9. Trimethoprim + Sulfamethoxazole

Use: Prophylaxis and treatment of *P. carinii pneumonia*; UTI caused by *E. coli*, *Klebsiella*, *P. mirabilis*, *Enterobacter*; susceptible Shigellosis and Typhoid.

Dosage: Children > 2 mth PO.

- Mild to moderate infections: 6-12 mg of TMP/kg/day divided q 12 hrly.
- Severe infection: 15-20 mg of TMP/kg/day divided q 6-8 hrly.

- Prophylaxis of pneumocystis: 5 mg/kg of TMP single dose on alternate day.
- UTI prophylaxis: 2 mg of TMP/kg/dose daily or 5 mg TMP/kg/dose twice weekly.

Brands: TMP + SMZ, 160 + 800, 80 + 400 and 20 + 100 mg Tab; 40 + 200 mg/5 ml Susp; Bactrim, Septran. 160 + 800 mg Tab; Sepmax.

Combination: Trimethoprim IP 160/80/20 mg, Sulphamethoxazole IP 800/400/100 mg, Trimethoprim IP 40 mg + Sulphamethoxazole IP 200 mg/5 ml.

- Cl in folate deficiency megaloblastic anemia. May cause Stevens Johnson Syndrome, Agranulocytosis, Hepatic necrosis.

10. Vancomycin

Use: Active against gram-positive pathogens including *Staphylococcus* (including MRSA and coagulase negative *staphylococci*), *S. pneumoniae*, *Enterococcus* and *Clostridium difficile* associated colitis.

Dosage: IV:

Neonates: PNA < 7 days:

1200-2000 gm: 15 mg/kg/day divided q 12-18 hrly;

> 2000 gm: 30 mg/kg/day divided q 12 hrly;

PNA > 7 days:

1200-2000 gm: 15 mg/kg/day divided q 8-12 hrly;

> 2000 gm : 45 mg/kg/day divided q 8 hrly;

Infants > 1 mth and Children: 40-60 mg/kg/day divided q 6 hrly (Max: 1 gm/dose).

Clostridium associated colitis: PO; 40-50 mg/kg/day divided q 6-8 hrly.

Brands: 500 mg and 1 gm Vial; Vancocin CP and Vancogen. 125 mg Cap; Vancocin CP.

Administration: IV: Concentration should not exceed 5 mg/ml.

- Rapid infusion is associated with Red Man Syndrome; administration of antihistamines just before infusion may prevent or minimize this reaction.

5 CHAPTER

Anticoagulants

1. Enoxaparin

Use: Treatment and prophylaxis of venous thromboembolism.

Dosage: SC; Treatment; 1-1.5 mg/kg q 8-12 hr. Prophylaxis: 0.5-0.75 mg/kg q 8-12 hr.

Brands: 10 mg/0.1 ml Inj; Clexane, LMWX, Lupenox.

- May cause hemorrhage, thrombocytopenia, GI symptoms. Do not rub after SC injection as bruising may occur. Therapy should be discontinued if platelet count falls below 1 lakh/mm^3. Accidental overdosage may be treated with protamine sulfate.

2. Heparin

Use: Treatment and prophylaxis of thromboembolic disorders.

Dosage:

- IV: Loading dose of 50 units/kg given over 10 minutes followed by continuous infusion of 15-35 units/kg/hr as maintenance dose.
- For arterial lines and TPN: 0.5-1 units/ml is added.
- For line flushing: 10-100 units/ml (volume used is 2-5 ml/flush).

Brands: 1000 and 5000 units/ml Inj; Beparine, Heparin, V-parin.

- To reverse the effect of heparin use protamine. Contraindicated in severe thrombocytopenia, bacterial endocarditis, intracranial hemorrhage, shock. Maintain APTT to 1.5 to 2.5 times of control.

3. Warfarin

Use: Treatment and prophylaxis of venous thromboembolic disorders and pulmonary embolism; arterial thromboembolism in patient with prosthetic heart valves or atrial fibrillation.

Dosage: Loading dose of 0.2 mg/kg once then followed by 0.1 mg/kg/day. Dose is titrated according to prothrombin time value.

Brands: 1, 2 and 5 mg Tab; Uniwarfin, Warf.

- Overdose can be treated with vitamin K. May cause hemoptysis, hemorrhage, skin necrosis, GI symptoms.

6 CHAPTER Antidepressants

1. Amitriptyline

Use: Depression, migraine prophylaxis, analgesic for neuropathic pain.

Dosage:

- Depression: 1-1.5 mg/kg/day divided q 8 hr.
- Analgesic and migraine prophylaxis: 0.5 mg/kg at bedtime can be increased gradually over 2-3 wk to 2mg/kg at bedtime.

Brands: 10, 25, 50 mg Tab; Nildep, Tryptomer.

- May cause postural hypotension, drowsiness, confusion, constipation, weight gain, tremor, urine discoloration, blurred vision, dry mouth, urinary retention. Do not stop abruptly in patient on chronic therapy.

2. Bupropion

Use: Depression, ADHD.

Dosage: PO; 75-100 mg/day in 3 divided doses.

Brands: 150 mg Tab; Bupep, Zyban.

3. Doxepin

Use: Depression, relief from neuropathic pain.

Dosage: 1-3 mg/kg/day in 1-2 divided doses.

Brands: 25 mg Tab; Dox, Saliter. 10, 25 and 75 mg Cap; Dox, Spectra.

- May cause excessive sedation, postural hypotension, anticholinergic effect.

4. Fluoxetine

Use: Depression and obsessive compulsive disorder.

Dosage: > 5 yr: 5-10 mg starting dose and can be gradually increased to maximum dose of 20 mg/kg/day once daily.

Brands: 10 and 20 mg Tab; Flunat, Flunil, Nuzac, Prodep.

- May cause headache, nervousness, anxiety, insomnia, diarrhea, anorexia, constipation. Evening dose can be given before 4 pm to avoid insomnia.

5. Imipramine

Use: Depression, enuresis.

Dosage:

- Depression: 1.5 mg/kg/day, if required may be increased to 1 mg/kg every 3-4 days to a maximum of 5 mg/kg/day in divided doses.
- Enuresis: > 6 yr: Start at 10-25 mg at bedtime, if adequate response is not seen after 1 week then can be increased gradually to 50 mg for 6-12 yr of age and 75 mg for > 12 years of age.

Brands: 25 mg Tab; 75 mg Cap; Antidep, Depsonil, Impramine.

- Side effect same as amitriptyline.

6. Lithium

Use: Acute manic episodes, depression, bipolar disorders.

Dosage: 15-60 mg/kg/day in 3-4 divided doses (Max: 900 mg/day). Start at lower doses and adjust weekly.

Brands: 250, 300, 400 mg Tab; Lithium, Lithosun. 150 mg Tab; Intalith.

- May cause polydipsia, weight gain, impaired taste, tremor, leucocytosis, vision problem, fatigue, hypotension, seizures.

7. Nortriptyline

Use: Antidepressant, nocturnal enuresis.

Dosage:

- Nocturnal enuresis: 10-20 mg/day, titrate upward to a maximum of 40 mg/day. Give dose 30 minutes before bedtime.
- Depression: 1-3 mg/kg/day divided q 6 hr.

Brands: 25 mg Tab; Daventyl, Nordep, Sensival.

- May cause postural hypotension, tachycardia, weight gain, xerostomia, urinary retention, tremor, blurred vision.

8. Sertraline

Use: Depression, obsessive compulsive disorder, panic disorder, attention deficit disorder, post-traumatic stress disorder.

Dosage:

- 6-12 yr: Initial 25 mg/day, can be increased by 25 mg weekly up to a desired response (Max: 200 mg/day)
- > 12 Years: Initial 50 mg/day, increase 25-50 mg weekly up to a desired response (Max: 200 mg/day).

Brands: 25, 50 and 100 mg Tab; Serlift, Serne, Serta, Setral.

- May cause dry mouth, GI disturbances, tremor, insomnia, fatigue, urinary incontinence.

7 CHAPTER Antidotes/Poisoning

There are only very few specific antidotes available; other only modify the symptoms.

1. Acetylcysteine

Use: Acetaminophen (paracetamol) toxicity.

Dosage: PO; Initial dose of 140 mg/kg followed by 70 mg/kg q 4 hr for 68 hr (17 doses). IV; Initial dose of 150 mg/kg over 1/2-1 hr followed by 50 mg/kg over 4 hr, then 100 mg/kg over 16 hr.

Brands: 600 mg Tab; 200 mg/ml solution (20%) for injection; Mucomix.

- Acute flushing and erythema may occur within half to one hour after IV infusion. Use with caution in patient with asthma or prior history of bronchospasm.

2. Atropine

See under antiarrhythmic.

3. Benztropine

Use: Treatment of drug induced extrapyramidal effects and acute dystonic reaction.

Dosage: 0.02-0.05 mg/kg/dose BD; IV or PO in children > 3 yr of age (Max: 4 mg).

S/E: Sedation, blurred vision, dry mouth, tachycardia.

4. Cyanide KIT (Amyl Nitrate, Sodium Nitrite, Sodium Thiosulphate)

Use: Cyanide and hydrogen sulphide (nitrite only) poisoning.

Dosage: Amyl nitrite: 0.3 ml inhalation for 15-30 sec of each minute followed by rest. Sodium nitrite: 0.33 ml/kg of 3% solution slowly IV (Max: 10 ml). Sodium thiosulphate: 1.65 ml/kg of 25% solution IV at a rate of 2.5-5 ml/minute (Max: 50 ml).

S/E: Methemoglobinemia (avoid levels more than 30%).

5. Charcoal

See under miscellaneous drugs.

6. Chlorpromazine

Use: Amphetamine toxicity.

Dosage: IM, IV: 1 mg/kg.

Brands: 25 mg/ml Inj; Megatil.

7. Deferiprone

See under chelating agents.

8. Desferrioxamine

See under chelating agents.

9. Digoxin Immune Fab

Use: Digitalis glycoside toxicity.

Dosage: Depends upon body load of digoxin, it can be determined as; mg of digoxin ingested × 0.8. One vial binds 0.6 mg of digitalis glycoside.

Brands: 38 mg/Vial; Digibind.

10. Dimercaprol (Bal)

See under Chelating Agents.

11. Dimercaptosuccinic Acid (Succimer, DMSA)

Use: Lead poisoning.

Dosage: PO; 10 mg/kg/dose q 8 hr for 5 days, then 10 mg/kg 12 hr.

12. Diphenhydramine

Use: Phenothiazine induced dystonic reactions.

Dosage: PO; 5 mg/kg/day divided q 8 hr (Max: 300 mg/day).

Brands: 12.5 mg/5 ml Syrup; Benadryl.

S/E: Sedation, paradoxical agitation, ataxia.

13. D-Penicillamine

See under chelating agents.

14. Edetate Calcium Disodium (EDTA)

Use: Lead, Manganese, Nickle and Zinc toxicity.

Dosage:IM; IV: 50-75 mg/kg/day or 1-1.5 gm/m^2/day divided q 6 hr as 0.2-0.4% solution for 5 days.

Brands: Available as 200 mg/ml Injection.

- IM route is preffered over IV. Avoid rapid IV infusion as it may lead to fatal elevation of ICP. May cause HT, allergic reaction, nephrotoxicity.

15. Ethanol

Use: Ethylene glycol and methyl alcohol ingestion.

Dosage:

- Ethylene glycol ingestion: 10 ml/kg of 10% solution IV or 1 ml/kg of 95% solution PO. Maintenance dose is 1.5 ml/kg/hr of 10% solution IV or 3 ml/kg/hr of 10% solution during hemodialysis.
- Methanol ingestion: 10 ml/kg of 10% solution IV as loading dose followed by 1.5 ml/kg/hr infusion.
- Target of treatment is to achieve methanol/ethylene glycol blood level 100-130 mg/dl.

16. Flumazenil

Use: Benzodiazepine toxicity.

Dosage: IV: Given in incremental doses of 0.1, 0.2, 0.3 mg at 1 min interval until desired effect is achieved (Max: 1 mg).

- Do not use in unknown or antidepressant ingestion.

17. Glucagon

See under miscellaneous drugs.

18. Hyperbaric Oxygen

Use: Carbon monoxide poisoning.

Dosage: Half life of carboxyhemoglobin is 5 hr in room air but in 100% oxygen half life is 1.5 hr. Give until carboxyhemoglobin level comes to less than 10%.

19. Methylene Blue

Use: Methemoglobinemia (drug induced).

Dosage: 0.1 to 0.2 ml/kg of 1% solution by slow infusion, may be repeated after 30-60 minutes.

Brands: Available as 10 mg/ml Injection.

20. Naloxone

Use: Morphine and other opioid poisoning.

Dosage: IV: 0.1 mg/kg/dose may be repeated q 2-3 minutes if required till the reversal of toxic effect (Max: 2 mg/dose and total Max: 10 mg).

Brands: 0.4 mg/ml Inj; Nalox, Narcotan.

21. Octreotide

Use: Sulfonylureas poisoning.

Dosage: 1 mcg/kg/dose q 12 hr.

Brands: 50 and 100 mcg/ml Inj; Actide, Octate.

- During Octreotide therapy, also required simultaneously high dose glucose.

22. Physostigmine

Use: Anticholinergic stress (Dhatura poisoning), baclofen and atropine toxicity.

Dosage: IM, IV: 0.02 mg/kg, may be repeated q 5-10 minutes to maximum 2 mg or till the desired effect occur.

- May cause bradycardia, asystole, seizure.

23. Pilocarpine

Use: Atropine toxicity.

Dosage: 2-4 mg, PO.

Brands: 10 mg Tab; Pilomax.

24. Pralidoxime (PAM)

Use: Organophosphorus (Insecticide) poisoning.

Dosage: IM, IV: 25-50 mg/kg as 5% solution over 15-20 min. The dose may be repeated after 1-2 hr and then at 10-12 hr interval if cholinergic crisis recur.

Brands: 1 mg Inj; Clopam, Lyphe.

S/E: Tachycardia, bronchospasm, seizure.

25. Protamine

See under drug used for controlling bleeding.

26. Pyridoxine

See under vitamins.

27. Vitamin K (Phytomenadione)

Use: Warfarin poisoning.

Dosage: 5-10 mg IM or IV.

Brands: 10 mg/ml Inj; Kenadion.

Additional Antidotes:

- **Calcium Gluconate:** Used in calcium channel blocker overdose and in hydrofluoric acid poisoning.
- **D-25 and 50%:** Used in insulin overdoses.
- **Edrophonium, Neostigmine:** Used in neuromuscular blocking agent poisoning.
- **Sodium Bicarbonate:** Phenothiazine and tricyclic antidepressant poisoning.
- **Calcium Folinate:** Methotrexate, pyrimethamine, trimethoprim toxicity.

8 CHAPTER

Antiemetics

1. Dimenhydrinate

Use: Prevention and treatment of nausea, vomiting and vertigo associated with motion sickness.

Dosage: PO, IV, IM: Not indicated below 2 yr.

2-5 yr: 12.5-25 mg q 6-8 hr (Max: 75 mg/day).

6-12 yr: 25-50 mg q 6-8 hr (Max: 150 mg/day).

Brands: 50 mg Tab; Draminate, Gravol. 15.6 mg/5 ml Syrup; 50 mg/ml Inj; Draminate.

- May cause excitation in young children; use with precautions in patients with seizure disorder. May lead to masking of signs and symptoms of ototoxicity in patients on aminoglycosides, furosemide therapy.

2. Domperidone

Use: Nausea and vomiting, reflux esophagitis, dyspepsia.

Doses: PO: 0.3 mg/kg/dose q 4-8 hr.

Brands: 10 mg Tab; 1 mg/ml Syrup; Domperon, Domstal, Normetic. 1 mg/ml drops; Vomistop.

Combinations: Domperidone + PCM: 10 + 500 mg Tab; Dompar, Domstal-P, Motinorm-P.

Domperidone + Pantoprazole: 10 + 20 mg Tab; Dompan.

Domperidone + Ranitidine: 10 + 150 mg Tab; Gaspaz.

- Contraindicated in GI obstruction or perforations. May increase prolactin secretion leading to gynecomastia in males and galactorrhea in females.

3. Granisetron

Use: Antiemetic in chemotherapy, radiation related and postoperated nausea and vomiting.

Dosage: IV: Children > 2 yr: 10-20 mcg/kg half an hour before chemotherapy; 2-3 doses may be given. PO: adults: 1 mg BD or 2 mg OD 1 hour before chemotherapy.

Brands: 1 and 2 mg Tab; 1 mg/ml Inj; Granicip, Topit. 1 mg/ml drops; Graniset.

- May cause hypo or hypertension, arrhythmias, agitation.

4. Meclizine

Use: Motion sickness, vertigo, nausea and vomiting.

Dosage: PO $\geq$ 12 yr.

- Vertigo: 25-100 mg/day in divided doses.
- Motion sickness: 25-50 mg 1 hour before journey.

Brands: Available in combination.

Meclizine 12.5 mg + Nicotinic acid 50 mg: Diligan Tab.

Meclizine 12.5 mg + Vitamin B_6 50 mg: PNV Tab.

5. Metoclopramide

Use: Gastroesophageal reflux, prevention of nausea and vomiting due to various causes, symptomatic treatment of diabetic gastric stasis.

Dosage:

- GE reflux: PO, IV, IM: 0.4-0.8 mg/kg/day divided q 6-8 hr.

- Postoperative nausea and vomiting: IV: 0.1-0.2 mg/kg/dose.
- Chemotherapy induced vomiting: PO, IV: 1-2 mg/kg/dose q 2-4 hr as required.

Brands: 100 mg Tab; 5 mg/ml Syrup; 5 mg/ml Inj; Maxeron, Perinorm, Reglan, etc.

- Contraindicated in GI obstruction, past history of seizures. Causes extrapyramidal reactions and these can be prevented and treated with diphenhydramine.

6. Ondansetron

Use: Prevention of nausea and vomiting of various etiology.

Dosage: PO: < 4 yr, 1-3 mg; 4-11 yr. 4 mg; >11 yr, 8 mg q 8 hrly. IV: 0.15-0.45 mg/kg/dose q 8 hr.

Brands: 4 and 8 mg Tab; 2 mg/5 ml Syrup; 4 mg/ml Inj; Emeset, Ondem, Periset.

Combinations: Ondansetron + PCM and Ondansetron + Ranitidine.

Administration: For IV dilute to 1 mg/ml and be given over 15 minutes.

7. Prochlorperazine

Use: Nausea, vomiting, vertigo, severe intractable migraine.

Dosage:

- Not indicated in < 2 yr or < 9 kg. PO: 0.4 mg/kg/day divided q 6-8 hr. IM: 0.1-0.15 mg/kg/day divided q 8-12 hr.

Brands: 5 mg Tab; Bemetil, Stemetil, Vometil. 12.5 mg/ml Inj; Stemetil, Steminol.

- Chances of extrapyramidal reactions are high in children so always use lowest possible dose.

8. Promethazine

Use: Allergic conditions, motion sickness, antiemetic and sedation.

Dosage: Not indicated below 2 yr of age.

- Antihistamine: PO: 0.1 mg/kg/dose q 6 hr (Max: 12.5 mg/day).
- Antiemetic: PO, IM, IV: 0.25-1 mg/kg/dose q 6 hr (Max: 25 mg/dose).
- Sedation: PO, IV, IM: 0.5-1 mg/kg/dose q 6 hr (Max: 50 mg/dose).
- Motion sickness: PO: 0.5 mg/kg half an hour before journey, can be repeated after 12 hr as needed.

Brands: 10 and 25 mg Tab; 5 mg/5 ml Elixir; Phenergan, Prometh, Promet. 5 mg/ml Inj; Phenergan.

- IM route is preferred, avoid IV use. May cause hypotension in fast IV and hypertension in slow IV use. Children with dehydration are prone to develop dystonic reactions.

Chlorpromazine and hydroxyzine also have antiemetic actions. Dexamethasone and Lorazepam are used as adjunctive antiemetic.

9 CHAPTER

Antiepileptics

1. ACTH

Use: Infantile spasms, muscle weakness in myasthenia gravis.

Dosage: IM, SC; Infantile spasms: 5-60 units/kg/day for 1 week to 12 months.

Brands: 60 units/ml Inj; Actonprolongatum. 40 and 80 units/ml Inj; Corticotrophin.

- Prednisolone 2 mg/kg/day is equally efficacious as ACTH for infantile spasms. Don't administer live vaccine while on ACTH therapy.

2. Carbamazepine

Use: Prophylaxis of generalized tonic-clonic, partial, mixed partial or generalized seizures; to relieve pain in trigeminal neuralgia or diabetic neuropathy; treatment of bipolar disorders; myotonic muscular dystrophy.

Dosage: Dosage must be adjusted according to patients response and serum concentrations.

< 6 yr: Initial 5 mg/kg/day in 2-4 divided doses; may increase q 5-7 days by 5 mg/kg based on effect (Max: 35 mg/kg/day).

> 6 yr: Initial 10 mg/kg/day in 2-4 divided doses; increase by 100 mg or 5 mg/kg/day at weekly intervals until desired levels are achieved; usual maintenance: 400-800 mg/day.

Brands: 100, 200, 400 mg Tab; Carbatol, Mazetol, Tegrital. 100 mg/5 ml Susp; Mazetol, Tegrital.

- A high fat meal may increase the rate of absorption and reduce time to peak concentration. Children < 12 yr who receive > 400 mg/day may be converted to extended release preparations using the same total daily dosage. Administer with food to decrease GI upset. Observe patient for excessive sedation especially when starting or increasing therapy. It is not effective in absence, myoclonic, akinetic or febrile seizures; exacerbation of certain seizure types have been seen after initiation of therapy in children with mixed seizure disorders.

3. Clobazam

Use: Add on therapy for complex partial, generalized clonic and tonic, absence, myoclonic, etc.

Dosage: PO: 0.25 to 1 mg/kg/day divided twice or thrice daily.

Brands: 5, 10, 20 mg Tab; Cloba, Clozam, Frisium.

4. Clonazepam

Use: Alone or add on drug for absence, akinetic, Lennox-Gastaut, myoclonic and infantile spasms.

Dosage: PO: Initial daily dose: 0.01-0.03 mg/kg/day divided 2-3 doses (Max dose: 0.05 mg/kg/day); increase by maximum of 0.5 mg every third day until seizures are controlled or adverse effects seen. Maintenance dose: 0.1-0.2 mg/kg/day divided 3 times/day (Max: dose 0.2 mg/kg/day).

Brands: 0.25, 0.5, 1 and 2 mg Tab; Clonotril, Lonazep, Melzep.

- Prolonged use may lead to loss of efficacy.

5. Diazepam

Use: Status epilepticus, skeletal muscle relaxant in tetanus, general anxiety, febrile seizures, preoperative sedation.

Dosage:

Status epilepticus: IV: Neonates (Not as a first line drug) 0.1 to 0.3 mg/kg/dose given over 3-5 minutes, every 15-30 minutes to a maximum total dose of 2 mg. Infants and children: 0.05-0.3 mg/kg/dose given over 3-5 minutes, every 15-30 minutes to a maximum total dose of 5 to 10 mg.

Rectal: 0.5 mg/kg, then 0.25 mg/kg in 10 minutes if needed.

Sedation: PO: 0.2-0.3 mg/kg (Max: 10 mg); IM/IV: 0.04-0.3 mg/kg/dose (Max: 0.6 mg/kg every 8 hrly if required).

Febrile seizures prophylaxis: PO: 0.1 mg/kg/day divided every 8 hrly; initiate therapy at the first sign of fever and continue for 24 hr after fever is gone.

Neonatal tetanus: 0.5 to 5 mg/kg/every 2-4 hrly IV along with chlorpromazine.

Brands: 2 mg/5 ml Susp; Calmpose 2 mg, 5 mg, 10 mg Tab; Anxol, Calmpose, Valium. 5 mg/ml Inj; Anxol, Valium, Zepose. 2 mg/ml Direc 2 rectal diazepam.

- Rapid IV push may cause sudden respiratory depression, apnea or hypotension. Do not exceed 1-2 mg/minute for IV push.

6. Ethosuximide

Use: Used for absence, myoclonic and akinetic seizures.

Dosage: PO: Children < 6 yr: Initial: 15 mg/kg/day in 2 divided doses (Max: 250 mg/dose); increase every 4-7 days; Maintenance dose: 15-40 mg/kg/day in 2 divided doses; Children > 6 yr: Initial: 250 mg twice daily; increase by 250 mg/day every 4-7 days (Max: 1.5 g/day).

Brands: 250 mg Cap; 50 mg/ml Susp; Zorantin.

- Ethosuximide may increase tonic-clonic seizures in mixed seizure disorder. May cause blood dyscrasias.

7. Fosphenytoin

Use: Management of generalized status epilepticus; used for prevention and management of seizures responsive to phenytoin.

Dosage: Loading dose is 15-20 mg/kg. May substitute IV or IM for phenytoin maintenance doses.

Brands: 75 mg/ml Inj; Fosphen, Fosolin.

- Fosphenytoin sodium 1.5 mg is equivalent to phenytoin sodium 1 mg. Abrupt withdrawal of phosphenytoin may precipitate status epilepticus. Consider the amount of phosphate delivered by fosphenytoin in patients who require phosphate restriction (each 1.5 mg delivers 0.0037 mmol of phosphate). More water soluble than phenytoin.

8. Gabapentin

Use: Add on therapy for partial and secondary generalized seizures; neuropathic pain; migraine.

Dosage: PO: Children 3 to 12 yr: 15-35 mg/kg/day in 3 divided doses (Max dose: 50 mg/kg/day). Children > 12 yr: Start by 300 mg daily; then increase by 300 mg/day to maximum of 900-3600 mg/day in 3 divided doses.

Brands: 300, 400 mg Tab; Gabapin, Neurontin.

- Antacids reduce the bioavailability by 20%. May impair ability to perform activities requiring mental alertness.

9. Lamotrigine

Use: Add on therapy of partial seizures and generalized seizures of Lennox-Gastaut syndrome.

Dosage: PO: Children 2-12 yr on valproic acid: 0.15 mg/kg/day in 2 divided doses for 2 wk; then 0.3 mg/kg/day for next 2 wk; Maintenance dose is 1-5 mg/kg/day (Max dose: 200 mg/day).

Children 2-12 yr on enzyme inducing AED's: 0.6 mg/kg/day in 2 divided doses for 2 wk, then 1.2 mg/kg/day for next 2 wks; Maintenance dose is 5-15 mg/kg/day (Max: 400 mg/day).

Brands: 5, 25, 50 and 100 mg Tab; Lamitor.

- Fatal rashes may occur if high initial doses or rapid dosage increment is done. May cause swelling of glands and photosensitivity.

10. Levetiracetam

Use: Adjunctive therapy in partial, myoclonic and tonic-clonic serizure.

Dosage: PO;

- 4-12 yr: Start at 10 mg/kg/dose twice daily, can be increased every 2 wk by 10 mg/kg up to a maximum dose of 30 mg/kg/dose twice daily.
- > 12 yr: Start at 10 mg/kg/dose twice daily, can be increased every 2 wk to maximum of 1500 mg twice daily.

Brands: 250, 500, 750 mg Tab; Levtam, Levipil. 100 mg/ml Solution; Levroxa.

- Do not stop abruptly. May cause drowsiness, fatigue and aggressive behavior.

11. Lorazepam

Use: Status epilepticus, anxiety, sedation and add on antiemetic therapy.

Dosage:

Status epilepticus: IV: Neonates: 0.05 to 0.2 mg/kg/dose over 2-5 min; may repeat in 10-15 min. Infants and children:

0.1 mg/kg/dose over 2-5 min; repeat after 10-15 min if required in a dose of 0.05 mg/kg.

Anxiety/Sedation: IV: Neonates: 0.1 to 0.4 mg/kg/dose every 4-6 hrly as needed. Infants and children: 0.05 to 0.1 mg/kg/dose q 4-8 hrly.

Antiemetic therapy: IV: 0.04-0.08 mg/kg/dose every 6 hrly as needed.

Brands: 1 mg, 2 mg Tab; 2 mg/ml Inj; Anxilor, Calmese, Lopez.

Administration: IV: Don't exceed 0.05 mg/kg over 2-5 minutes or 2 mg/min; dilute with equal volume of compatible diluent.

- Do not use in comatose patient, pre-existing CNS depression, hypotension and narrow angle glaucoma.

12. Midazolam

Use: Status epilepticus, sedation, continuous IV for sedation of intubated and mechanically ventilated patients.

Dosage: IV:

Neonates: Conscious sedation during mechanical ventilation; continuous infusion: 0.15-0.5 mcg/kg/min.

Infants > 2 mth and children:

Status epilepticus: Loading dose: 0.15 mg/kg followed by continuous infusion of 1 mcg/kg/minute.

Sedation: 0.05 - 0.2 mg/kg loading dose; may be repeated after 1-2 hr if required or continous infusion of 1-2 mcg/kg/min.

Brands: 1 mg/ml and 5 mg/ml Inj; Fulsed, Midosed, Shortal.

Administration: For IV administer at a concentration of 1-5 mg/ml to be given over 2-5 minutes.

- Sodium content of injection is 0.14 mEq/ml. Contraindicated in shock, pre-existing CNS depression.

13. Nitrazepam

Use: Absence, myoclonic, infantile spasms, insomnia, partial epilepsy.

Dosage: PO: Start with 0.2 mg/kg/day then gradually increase up to 1 mg/kg/day as required divided every 12 hr. or HS.

14. Oxcarbazepine

Use: Add on or monotherapy for partial and generalized tonic-clonic seizures.

Dosage: Not recommended in < 3 yr: PO; Children 3-17 yr: Initial 8-10 mg/kg/day in 2 divided doses (Max dose: 600 mg/24 hr); increase over 2 wk to 30-45 mg/kg/day as per response.

Brands: 150, 300 and 600 mg Tab; Oxcarb, Oxeptal, Oxrate, etc. 300 mg/5 ml Susp; Selzic.

- Significant hyponatremia may occur with its use.

15. Paraldehyde

Use: Add on therapy for refractory status epilepticus; and as sedative.

Dosage: IM: 0.15 ml/kg/dose; may repeat after 4-6 hr. PR: 0.3 ml/kg/dose mixed with 3:1 in coconut oil; may repeat after 4-6 hr.

Brands: 1 gm/ml Inj; Paraldehyde.

Administration: May cause nerve damage during IM use, inject carefully. Drug react with plastic; use glass syringe.

16. Phenobarbital

Use: Management of generalized tonic-clonic and partial seizures; neonatal seizures; febrile seizures in children; sedation; may also be used for prevention and treatment of neonatal hyperbilirubinemia and lowering of bilirubin in chronic cholestasis.

Dosage: Anticonvulsant: Status epilepticus: Loading dose: IV: 15-20 mg/kg in a single or divided doses.

[In selected patients, be given additional 5 mg/kg/dose every 15-30 minutes until seizure is controlled or a total dose of 30 mg/kg is reached; be prepared to support respiration] Maintenance dose: PO, IV: (Usually starts 12 hr after loading dose). 5 to 6 mg/kg/day in 2 divided doses.

Sedation: PO: 2 mg/kg 3 times/day.

Hyperbilirubinemia: PO: 3-8 mg/kg/day in 2-3 divided doses.

Brands: 30, 60 mg Tab; 200 mg/ml Inj; Fenobarb, Gardenal. 20 mg/5 ml Syrup; Gardenal.

- Do not give IV faster than 1 mg/kg/min with a maximum of 30 mg/min for infants and children. Abrupt withdrawal may precipitate status epilepticus. Dietary requirements of vitamins D, K, C, B_{12} folate and calcium may be increased with long-term use. May adversely affect the cognitive performance of children treated on a long-term basis.

17. Phenytoin

Use: Management of generalized tonic-clonic, simple partial and complex partial seizures; prevention of seizures following head trauma/neurosurgery; ventricular arrhythmias, including those associated with digitalis intoxication; myotonic muscular dystrophy.

Dosage:

- Status epilepticus: IV: Loading dose; Neonates: 15-20 mg/kg in a single or divided dose. Infants and children: 15-18 mg/kg in a single or divided dose. Maintenance dose: Start after 12 hr of loading dose: 6-8 mg/kg/day.
- Anticonvulsant: Infants and children: PO: Loading dose: 15-20 mg/kg in 3 divided doses. Maintenance dose: Same as IV maintenance dose.
- Arrhythmias: Loading dose: IV: 1.25 mg/kg every 5 minutes, may repeat up to total loading dose of 15 mg/kg. Maintenance dose: Oral: 5-10 mg/kg/day in 2-3 divided doses.

Brands: 50, 100 mg Tab; 50 mg/ml Inj; Dilantin, Epsolin. 125 mg/5 ml Susp; Dilantin.

Administration: Neonates: Do not exceed IV infusion rate of 0.5 mg/kg/minute; Infants, children: Do not exceed IV infusion rate of 1-3 mg/kg/minute; maximum rate: 50 mg/minute; IV injections should be followed by NS flushes to avoid local irritation of the vein. Dilute with NS to a concentration of 1-10 mg/ml and start infusion immediately after preperation. Avoid using in central lines.

18. Primidone

Use: Generalized tonic-clonic, complex partial and simple partial seizures.

Dosage: PO: Neonates: 12-20 mg/kg/day divided 8-12 hrly; may start with lower dosage and titrate upward. Children < 8 yr: 10-25 mg/kg/day divided 8-12 hrly. Children> 8 yr: Initial: 125-250 mg/day at bedtime; increase by 125-250 mg/day q 3-7 days (Max: 2 gm/day).

Brands: 250 mg Tab; Mysoline.

- May increase the metabolism of vitamin K and D; dietary requirement of vitamin D, K, B_{12}, folate and calcium may increase with long-term use.

19. Pyridoxine

Use: Pyridoxine dependent seizures in infants.

Dosage: Neonates: 10-100 mg/day. Infants: 50-100 mg/day.

- When giving large IV doses, monitor respiratory rate, heart rate and BP.

20. Thiopental

Use: Intractable seizures; induction of anesthesia; raised ICT.

Dosage: IV:

Seizures: 2-3 mg/kg; repeat as needed in 1 mg/kg/dose.

Increased ICT: Children: 1.5 to 5 mg/kg/dose; repeat as needed.

Induction of anesthesia: 3-4 mg/kg.

Brands: 500 mg and 1 gm Inj; Anesthal, Pentothal, Pentone.

Administration: For IV maximum concentration allowed is 50 mg/ml to be given over 1 hr. Rapid IV may cause hypotension or decreased cardiac output.

- Use with caution in patients with asthma or pharyngeal infections because cough, laryngospasm or bronchospasms may occur.

21. Topiramate

Use: Add on therapy of primary generalized tonic-clonic or partial onset seizures; Lennox-Gastaut syndrome in patients > 2 yr of age; *migraine.*

Dosage: PO: Children 2-16 yr: Initial 1-3 mg/kg/day divided 12 hr; increase q 1-2 wk by 1-3 mg/kg/day. Maintenance dose is 5-10 mg/kg/day.

Brands: 25, 50 and 100 mg Tab; Nextop, Topamate, Topex.

- Hyperchloremic metabolic acidosis may occur in some patients. Somnolence and fatigue are the most common CNS adverse effects in children.

22. Valproate Sodium

Use: Simple and complex partial seizures, simple and complex generalized seizures, mixed seizures type.

Dosage: PO, IV: Neonates: Loading dose for refractory seizures: 20 mg/kg followed by 10 mg/kg/dose q 12 hr. Children: Initial: 10-15 mg/kg/day in divided doses; increase by 5-10 mg/kg/day at weekly intervals until desired levels are achieved. Maintenance: 30-60 mg/kg/day. Total IV dose is equivalent to the total daily oral dose, however, it should be given divided every 6 hrly.

Brands: 200, 300, 500 mg Tab; Epirate, Varparin, Valparin. 100 mg/ml IV infusion; Encorate. 200 mg/5 ml Syrup; Valparin, Epilex.

Administration: For IV maximum concentration allowed is 20 mg/min. Syrup can be used as retention enema in 1:1 dilution with water.

- Higher doses up to 100 mg/kg/day may be required if used along with phenytoin, carbamazepine, etc. Hepatic failure and pancreatitis resulting in death may occur in children < 2 yr of age.

23. Vigabatrin

Use: Partial seizures and infantile spasms.

Dosage: PO: Start with 20-40 mg/kg/day; titrate slowly up to 80-150 mg/kg/day in two divided doses.

Brands: 500 mg Tab; Sobril.

- Do eye examination every 3-6 months if on vigabatrin therapy.

10 CHAPTER

Antifungals

1. Amphotericin-B

Use: Severe systemic infections and meningitis caused by candida, aspergillus and mucor species, etc. Treatment of visceral leishmaniasis. Liposomal Amp B is useful in cases refractory to or intolerant to conventional Amp B therapy.

Dosage: Conventional is started in a test dose of 0.1 mg/kg/dose to a maximum of 1mg infused over 1 hr. If test dose is tolerated then therapeutic dose of 0.4 mg/kg can be given on the same day. The daily dose then can be increased in 0.25 mg/kg increments to a dose of 1.5 mg/kg/day. Liposomal amphotericin can be used in higher doses upto 2.5-5 mg/kg/day.

Liposomal Amphotericin-B: Emperic therapy in systemic fungal infection; 3 mg/kg/day as once daily infusion. Visceral leishmaniasis; Day 1 to 5; 3 mg/kg once and for day 14 and 21, 3 mg/kg once.

Brands: 50 mg Vial; Amfocare, Ampholip, Fungizone.

Administration: Can be given over 2-3 hr in a concentration of 0.1-0.5 mg/ml.

- May cause hypokalemia, hypomagnesemia, azotemia, muscle and joint pain, neuropathy. Fever, chills, flushing, hypotension etc. can be avoided by prior medication with Meperidine and Acetaminophen.

2. Clotrimazole

Use: Oropharyngeal, cutaneous and vulvovaginal candidiasis, superficial mycosis, dermatophytoses.

Dosage: Topical: Apply twice or thrice daily.

- Vaginal: Apply applicator full of 1% cream daily at bedtime for 7-10 day or 100-200 mg vaginal tablet for 3-7 days. Avoid in < 3 yr of age.

Brands: Mouth paint, cream, powder, lotion, spray all 1%; Candid 100 and 200 mg vaginal Tab; Candid, Triben. 1% Ear drop, Clotrin.

Combinations:

- Chloramphenicol 5% + Clotrimazole 1% + Lidocaine 2% + Beclomethasone 0.025%; Candibiotic ear drop.
- Clotrimazole 1% + Lignocaine 2%; Candid and Surfaz ear drop.

3. Fluconazole

Use: Systemic, oropharyngeal, esophageal and vaginal candidiasis; Cryptococcal meningitis. Fungal infection of eyes, *T. cruris, T. corporis,* etc.

Dosage: PO; IV

- Systemic Candidiasis: 6-12 mg/kg/day for 28 days.
- Oropharyngeal, esophageal candidiasis: 6 mg/kg on day 1, then 3 mg/kg/day for 14-21 days.
- Cryptococcal meningitis: 12 mg/kg on day 1, then 6 mg/kg/day for 10-12 weeks.
- In neonates < 14 days, dosages are same except given q 48-72 hr.

Brands: 50, 150 and 200 mg Tab; 2 mg/ml Inj; Forcan, Zocon. 0.3% eye drop; Syscan, Zocon. 2% Zocon dusting powder.

4. Griseofulvin

Use: Tinea infection of skin, hair and nails caused by microsporum, epidermophyton, trichophyton.

Dosage: PO; Micronized is used in a dosage of 10-15 mg/kg/day in 2-3 divided doses, whereas ultra-micronized is used in dosages of 5-10 mg/kg/day. Duration of Therapy: *T. corporis*: 2-4 wk; *T. capitis*: 4-6 wk; *T. pedis*: 4-8 wk; *T. unguium*: 3-6 mth.

Brands: 125, 250 and 500 mg Tab; Dermonorm, Grisovin, Nufulvin.

5. Gentian Violet

Use: Mucocutaneous and cutaneous infection caused by *Candida albicans*.

Dosage: Apply solution under the tongue or on lesion after feeding. Apply to lesion with cotton, avoid application over ulcerative lesions of face.

Brands: 1 and 2% Gentian violet solution.

6. Hamycin

Use: Candidal oral thrush.

Dosage: Apply 2-3 times/day for 7-10 days.

Brands: Hamycin suspension 2 lac. unit/ml.

7. Itraconazole

Use: Active against *Candida*, *Cryptococcus*, *Aspergillus* and *Histoplasma*.

Dosage: 3-5 mg/kg/day once daily.

Brands: 100 mg Cap; Candistat, Canditral, Itracan.

- Decreased effect occurs with Rifampicin, Carbamazepine, Phenytoin, Omeprazole.

8. Ketoconazole

Use: Candidiasis, blastomycosis, histoplasmosis, oral thrush; topically for *T. corporis, T. cruris, T. versicolor* and cutaneous candidiasis. Shampoo is used for dandruff.

Dosage: PO; 3.3-6.6 mg/kg/day once daily.

Brands: 200 mg Tab; Fungicide, Ketozole, Nizral. 2% Shampoo; Danruf, Funginoc, Nizral. 2% solution; Arcolane, Dandoff. 2% Oint; Funginoc, Phytoral.

- Avoid antacids, H_2 blockers within 2 hr of use of ketoconazole as gastric acidity is necessary for good absorption of ketoconazole.

9. Miconazole

Use: Vulvovaginal candidiasis, topical treatment of superficial fungal infection.

Dosage: Topically apply twice daily. Vaginal apply 1 applicator full of cream at bedtime for 7 days.

Brands: 2% oint; powder and lotion; Zole. 2% vaginal cream; gynodactrin.

10. Nystatin

Use: Mucocutaneous, oral, vaginal fungal infection.

Dosage: Neonates: 100,000 units QID; Infants: 200,000 units QID; Children: 400,000-600,000 units QID. Topically: Apply twice or four times/day.

Brands: 500,000 units Tab; Mycostatin. 100,000 units vaginal Tab; Mycostatin vaginal.

11. Terbinafine

Use: Onchomycosis and ringworm.

Dosage: PO; For < 20 kg: 62.5 mg/day once; 20-40 kg: 125 mg/day; > 40 kg: 250 mg/day. Topically: Apply twice.

Brands: 125, 250 mg Tab; 1% cream; Exifine, Terbifin.

Duration: Finger nails infection 6 wk; Toe nails 12 wk and Tinea for 2 wk.

12. Tolnaftate

Use: *T. pedis, T. cruris, T. corporis, T. manuum and T. versicolor*.

Dosage: Apply 2-3 times/day for 2-4 wk.

Brands: Cream and solution; Tinaderm, Tinavate.

13. Voriconazole

Use: Invasive aspergillosis, esophageal candidiasis, infections caused by Fusarium, Malassezia.

Dosage: IV; 6 mg/kg/dose q 12 hr for 2 doses followed by 4 mg/kg/dose q 12 hr. PO; 3-5 mg/kg/dose q 12 hr.

Brands: 200 mg Tab; 200 mg vial; Voraze.

Administration: Given IV over 1-2 hr at a rate of 3 mg/kg/hr; final concentration should be 0.5-5 mg/ml.

11 CHAPTER

Antigout Agents

1. Allopurinol

Use: To prevent attacks of gouty arthritis and nephropathy; treatment of secondary hyperuricemia during chemotherapy of tumors or leukemia.

Dosage: ≤ 10 yr: 10 mg/kg/day divided q 8 hr > 10 yr: 200-600 mg/day divided q 8 hr.

Brands: 100 and 300 mg Tab; Aloric, Ciploric, Zyloric, Zyloric Tablets 100 mg/300 gm.

- Administer with plenty of fluids. May cause rashes, exfoliative dermatitis, leucopenia, thrombocytopenia, hepatitis, peripheral neuropathy. Discontinue drug use at first sign of rash.

2. Colchicine

Use: Acute and chronic gouty arthritis.

Dosage: Acute attack; 0.5-0.6 mg q 2 hr till the pain is relieved or GI toxicity occur (Max: 8 mg/day).

Brands: 0.5 mg Tab; Colijoy, Zycolchin.

- Side effects as of allopurinol.

3. Probenecid

Use: Prevention of gouty arthritis; also prolongs serum level of penicillin/cephalosporins.

Dosage: Initial dose of 25 mg/kg as single dose followed by 40 mg/kg/day divided q 6 hr (Max single dose: 500 mg).

Brands: 500 mg Tab; Bencid.

- Contraindicated in < 2 yr of age, blood dyscrasias, uric acid renal stones. Drink plenty of fluids to reduce the risk of uric acid stones.

12 CHAPTER

Anthelmintics

1. Albendazole

Use: Active parenchymal neurocysticercosis lesions of *Taenia solium*; cystic hydatid disease of liver, lung and peritoneum caused by *E. granulosus*; *Ascariasis*, *A. duodenale*, *Necator americanus*, *Enterobius*, *Trichuris trichura*, *Giardiasis*.

Dosage:

Neurocysticercosis: 15 mg/kg/day in 2 divided doses for 28 days (Max: 800 mg/day).

Hydatid disease: 15 mg/kg/day in 2 divided doses for 1-6 mth (Max: 800 mg/day).

Ascariasis, hookworm, whipworm: 400 mg as a single dose in more than 2 yr of age and 200 mg single in less than 2 yr of age.

Cutaneous larva migrans: 400 mg once daily for 3 days.

Enterobius: 400 mg as a single dose; repeat in 2 weeks.

Trichinosis: 400 mg twice daily for 8-14 days.

Visceral larva migrans: 400 mg twice daily for 5 days.

Giardiasis: 400 mg once a day for 5 days.

Brands: 400 mg Tab; 200 mg/5 ml Syrup; Albendal, Nemazole, Zentel, Zental Tabs 400 mg.

Combinations: Albendazole + Ivermectin.

- Use carefully in impaired hepatic function and decreased TLC. Corticosteroids should be administered 1-2 days before initiating albendazole therapy in patients with neurocysticercosis and should be followed by concurrent steroid and anticonvulsant therapy for the first week. Retinal lesions with neurocysticercosis is a contra-indication for albendazole therapy. Bioavailability is increased with fatty meal.

2. Diethyl Carbamazine (DEC)

Uses: Lymphatic filariasis (*B. malayi*, *B. timori*, *Wuchereria bancrofti*), Tropical eosinophilia, Loeffler's pneumonia due to ascariasis.

Dosage: Due to dose related complications, dose of DEC should be increased gradually.

For patients with high microfilaria levels: 1 mg/kg single dose on day 1; 1 mg/kg tid on day 2; 1 to 2 mg/kg tid on day 3; 6 mg/kg/day tid divided on days 4-14. For patients with no microfilaria in the blood: 6 mg/kg/day divided tid for 4-14 days.

Tropical eosinophilia: 10 mg/kg/day q 8 hr for 1 mth.

Loeffler's Pneumonia: 15 mg/kg/day single dose for 4 days.

Brands: 50, 100 mg Tab; 120 mg/5 ml Syrup; Banocide Hetrazan 50 mg/5 ml Syrup; Banocide.

Combinations:

DEC + Chlorpheniramine Maleate: 250 + 5 mg; Unicarbazan forte.

DEC + Cetrizine

3. Ivermectin

Use: Ascariasis, enterobiasis, strongyloidosis, filariasis, onchocerciasis, scabies, pediculosis.

Dosage: PO; 150 mcg/kg single dose.

Brands: 3 and 6 mg Tab; Ivermectol, Scavista, Vermin.

4. Levamisole

Use: Ascariasis, hookworms, mixed infestations and as immunomodulator.

Dosage: PO

Ascariasis: 2 mg/kg/day single dose.

Hookworm: 50 mg q 6 hr for 4 doses.

Immunomodulator: 2 mg/kg/day q alternate day for 1 mth.

Brands: 50 and 150 mg Tab; Dewormis, Levomol, Vermisol. 50 mg/5 ml Syrup, Vermisol.

5. Mebendazole

Use: Enterobiasis, trichuriasis, ascariasis, hookworm infections.

Dosage: PO

Pinworms: 100 mg single dose; may need to repeat after 2 weeks.

Whipworms, roundworms, hookworms: 100 mg twice daily for 3 days, if not cured within 3-4 weeks, a second course may be given.

Capillariasis: 200 mg twice a day for 20 days.

Brand: 100 mg Tab; 100 mg/5 ml Syrup; Mebex, Wormin, etc.

6. Niclosamide

Use: Treatment of tapeworm infections (beef, fish, dog and cat).

Dosage: Avoid below 2 yr of age.

Beef and fish tapeworms: 40 mg/kg once (Max: 2 g).

Dwarf tapeworms: 40 mg/kg/day for 7 days (Max: 2 g/day).

Brands: 750 mg/5 ml Syrup; 500 mg Tab; Antepar.

7. Piperazine

Use: Pinworms and roundworms.

Dosage: PO

Pinworms: 65 mg/kg/day once daily for 7 days.

Roundworms: 75 mg/kg/day once daily for 2 days.

Brands: 750 mg/5 ml Syrup; 500 mg Tab; Piprazine citrate, Antepar.

8. Praziquantel

Use: Schistosomiasis (all stages), many intestinal tapeworms and trematode infections.

Dosage: PO

Schistosomiasis: 20 mg/kg/dose q 8 hr for 1 day.

Cysticercosis: 50 mg/kg/day q 8 hr for 15 days.

Tapeworm: 5-10 mg/kg single dose.

Brands: 500 mg Tab; Cysticide. 600 mg Tab; Prazine.

- Contraindicated in spinal and ocular cysticercosis. Use steroids prior to starting praziquantel in neurocysticercosis; dexamethasone is recommended for patients with numerous cysts.

9. Pyrantel Pamoate

Use: Ascariasis, hookworm, pinworm and trichostrongyliasis infections.

Dosage: Contraindicated below 2 yr of age.

Pinworm, roundworm, trichostrongyliasis: 100 mg once; may repeat in 2 weeks.

Hookworms, roundworms, whipworms: 11 mg/kg single dose (Max dose: 1 g); may repeat in 2 wk for pinworm.

Brands: 250 mg Tab; 250 mg/5 ml Susp; Nemocid, Expent.

13 CHAPTER

Antihistamines

1. Astemizole

Use: Allergic rhinitis and conjunctivitis, chronic allergic dermatological problems, etc.

Dosage: PO; given once daily.

< 6 yr: 0.2 mg/kg; 6-12 yr: 5 mg; >12 yr: 10-30 mg.

Brands: 10 mg Tab; 5 mg/5 ml Syp; Acemiz, Stemiz.

- Avoid abrupt discontinuation.

2. Azatadine

Use: Allergic rhinitis, allergy, urticaria, etc.

Dosage: PO; > 12 yr and adults: 1-2 mg two times/day.

Brands: 0.5 mg/5 ml Syrup; 1 mg Tab; Zadine.

3. Cetrizine

Use: Allergic rhinitis, chronic idiopathic urticaria, various allergies.

Dosage: PO; Avoid below 2 years of age.

2-5 yr: 2.5 mg/day once or 2 divided doses.

> 6 yr: 5-10 mg/day once or 2 divided doses.

Brands: 10 mg Tab; 5 mg/5 ml Syrup; Alerid, Cetiriz, Cetzine, Hicet, Zyrtec.

- Also available in combinations in anticold preparations.

Combinations: Cetirizine 5 mg + Ambroxol 60 mg; Cetzine-A Tab.

4. Chlorpheniramine Maleate

Use: Allergic rhinitis, motion sickness, various allergic symptoms.

Dosage: PO

2-5 yr: 1 mg q 4-6 hr, 6-11 yr: 2 mg q 4-6 hr (Max: 12 mg).

> 12 yr: 4 mg q 4-6 hr (Max: 24 mg).

Brands: 4 mg Tab; Cadistin, Piriton.

Combinations: Chlorpheniranine maleate 2.5 mg + Ammonium chloride 125 mg + Sodium citrate 55 mg/5 ml; Piriton Expectorant. Chlorpheniramine maleate 4 mg + Dextromethorphan 10 mg + Menthol/5 ml; Piriton-CS.

- Available in combination with CPM, phenylephrine, PCM, dextromethorphan in anticold preparations.

5. Clemastine Fumarate

Use: Allergic rhinitis and various allergic symptoms.

Dosage: PO

1-6 yr: 0.3-0.5 mg/kg/day divided 8-12 hr (Max: 1 mg).
6-12 yr: 0.5-1.2 mg/kg/day divided 12 hr (Max: 2 mg).
>12 yr: 1.3-2.5 mg/kg/day divided 12 hr (Max: 5 mg).

Brands: 1 mg Tab; 0.5 mg/5 ml Syrup; Clamist, Travegyl.

6. Cyproheptadine Hydrochloride

Use: Various allergic symptoms, appetite stimulant, migraine prophylaxis.

Dosage: PO; 0.25 mg/kg/day divided 8-12 hr, or
2-6 yr: 2 mg q 8-12 hr, > 6 yr: 4 mg q 8-12 hr.
Migraine: 0.2-0.4 mg/kg at bed time.

Brands: 4 mg Tab; 2 mg/5 ml Syrup; Ciplactin, Peritol, Practin.

7. Desloratadine

Use: Allergic rhinitis, chronic idiopathic urticaria.
Dosage: PO; 2-5 yr: 1.25 mg/day OD;

6-12 yr: 2.5 mg/day OD;
>12 yr: 5 mg/day OD.

Brands: 5 mg Tab; Desent, Loreta, Neoloridin.

8. Diphenhydramine

Use: Allergic symptoms, mild night time sedation, motion sickness, antitussive, phenothiazine induced dystonic reactions.

Dosage: PO

- Dystonic reactions and allergic reactions: 5 mg/kg/day divided q 6-8 hr (Max: 300mg/day).
- Antitussive: 2-6 yr: 6.25 mg; 6-12 yr: 12.5 mg; > 12 yr: 25 mg q 4 hr.
- Night time sleep: 2-12 yr: 1 mg/kg/dose (Max: 5 mg/dose) > 12 yr: 50 mg.

Brands: 25 mg Cap; 12.5 mg/5 ml Syrup; Benadry l2.5 mg Tab; 12.5 mg/5 ml Syrup; Cofryl.

9. Fexofenadine

Use: Seasonal allergic rhinitis, chronic idiopathic urticaria.

Dosage: PO; 6-12 yr: 30 mg OD, >12 yr: 60 mg BD or 180 mg OD.

Brands: 30, 60 and 120 mg Tab; 60 mg/5 ml Syrup; Altiva.

120 and 80 mg Tab; 30 mg/5 ml Syrup; Fexidine.

- Erythromycin and Ketoconazole increases Fexofenadine plasma levels by decreasing its metabolism.

10. Hydroxyzine

Use: Allergy, anxiety, preoperative sedation and antiemetic.

Dosage: PO; 2 mg/kg/day divided q 6-8 hr, IM: 0.5-1 mg/kg/dose q 4-6 hr.

Brands: 10 and 25 mg Tab; 10 mg/5 ml Syrup; 6 mg/ml drops; 25 mg/ml Inj; Atarax, Hicope, Hyzer.

11. Loratidine

Use: Allergic rhinitis, chronic idiopathic urticaria.
Dosage: PO; 2-5 yr: 5 mg OD, >5 yr: 10 mg OD.
Brands: 10 mg Tab; 5 mg/5 ml Syrup; Alaspan, Loridin, Roletra.

- Macrolides, Ketoconazole, Theophylline decreases its metabolism.

12. Pheniramine

Use: Allergic rhinitis, urticaria, pruritis, drug rash.
Dosage: PO, IM, IV: 0.3-0.5 mg/kg/day divided q 8 hr.
Brands: 25 and 50 mg Tab; 22.75 mg/ml Inj; Avil.

13. Promethazine

See under antiemetic.

14. Pseudoephedrine

Use: Nasal congestion due to common cold, upper respiratory allergies and sinusitis, also helps in sinus and nasal drainage.

Dosage: PO; < 2 yr: 4 mg/kg/day divided q 6 hr.
2-5 yr: 15 mg q 6 hr; Max: 60 mg/day.
6-12 yr: 30 mg q 6 hr; Max: 120 mg/day.
> 12 yr: 60 mg q 6 hr; Max: 240 mg/day.

Brands: 60 mg Tab; 30 mg/5 ml Syrup; Sudafed.

Combinations:

Pseudoephedrine 60 mg + PCM 500 mg Tab; Coldeez, Sine-Aid.

Pseudoephedrine 60 mg + Cetrizine 10 mg Tab; Alcold, Alerid-D.

Pseudoephedrine 60 mg + Chlorpheniramine 4 mg + PCM 500 mg Tab; Alerfri, Coscold.

14 CHAPTER Antihypertensives

1. Atenolol

Use: Hypertension, alone or in combination; antiarrhythmic.

Dosage: PO; 0.8-1.5 mg/kg/day (Max: 2 mg/kg and do not exceed 100 mg/day).

Brands: 25, 50 and 100 mg Tab; Aten, Atenova, Betacard, Tenolol.

Combinations: Atenolol 50 mg + Nifedipine 20 mg Tab; Depten, Presolar.

- Contraindicated in pulmonary edema, cardiogenic shock, bradycardia, heart block, uncompensated CHF. Discontinue drug over 1-2 weeks and always avoid abrupt withdrawal. May mask signs of hyperthyroidism.

2. Captopril

Use: Hypertension and CHF.

Dosage: Must be titrated according to patient response.

- Neonates: 0.05-0.1 mg/kg/dose q 8-24 hr (Max: 0.5 mg/kg/day).
- Infants: 0.15-0.3 mg/kg/dose q 8-24 hr (Max: 6 mg/kg/day)
- Children: 0.3-0.5 mg/kg/dose q 8-24 hr (Max: 6 mg/kg/day).

Brands: 12.5 and 25 mg Tab; Aceten, Capace, Capotril.

Combinations: Captopril 25 mg + Hydrochlorthiazide 15 mg Tab; Angiopril-DU, Captopril-H.

- May cause neutropenia, agranulocytosis, cough, angioedema. Long term use may lead to zinc deficiency.
- Food decreases absorption by approximately 50%. Administration time need to be consistant.

3. Clonidine

Use: Hypertension, alternate agent for ADHD, aid in the diagnosis of pheochromocytoma and growth hormone deficiency.

Dosage: Children: PO

- Hypertension: 5-10 mcg/kg/day divided q 8-12 hr (Max: 0.9 mg/day).
- ADHD: Start at 0.05 mg/day, increase q 3-7 days by 0.05 mg/day, given divided q 3-4 hr (Max: 0.4 mg/day).
- Clonidine tolerance test: (Test of growth hormone release from pituitary) 4 mcg/kg as single dose.

Brands: 100 mcg Tab; Arkamin. 150 mcg Tab; Catapres. 150 mcg Inj; Arkamin, Catapres.

- Abrupt withdrawal may lead to rapid increase in blood pressure and symptoms of sympathetic over activity, so taper gradually over more than a week.

4. Diazoxide

Use: Emergency lowering of blood pressure, hypoglycemia related to hyperinsulinism.

Dosage:

- Hypertension: Children: IV: 1-3 mg/kg, may be repeated in 5-15 minutes (Max: 150 mg/dose).
- Hyperinsulinemic hypoglycemia: PO.

Newborns and Infants: 8-15 mg/kg/day divided q 8-12 hr.

Children: 3-8 mg/kg/day divided q 8-12 hr.

If beta blockers, hydralazine, nitrates are already in use in a patient, then use of diazoxide is not recommended within 6 hours.

5. Diltiazem

Use: Hypertension, atrial fibrillation or flutter, PSVT.

Dosage: PO

Children: 1.5-2 mg/kg/day in 3-4 divided doses.

Brands: 30 and 60 mg Tab; Cardem, Dicard, Dilzam, Masdil.

- Contraindicated in IInd or IIIrd degree heart block, sick sinus syndrome. Should not be stopped abruptly. May lead to bradycardia, hypotension, CHF, hepatic injury.

6. Enalapril

Use: Hypertension, CHF.

Dosage: PO

- Neonates: 0.1 mg/kg/day in divided doses (Max: 0.4 mg/day).
- Infants and children: 0.1-0.5 mg/kg/day in 2 divided doses.

Brands: 2.5, 5 and 10 mg Tab; Enam, Envas, Minipril, Vasopril.

- Side effects are similar to other ACE inhibitors

7. Hydralazine

Use: Hypertension, CHF.

Dosage:

IM, IV: 0.1-0.2 mg/kg/dose q 4-6 hr (Max: 3.5 mg/kg/day).

PO; 0.75-1 mg/kg/day in 2-4 divided doses (Max: 7.5 mg/kg/day).

Brands: 25 mg Tab and 20 mg/ml Inj; Apresoline.

- For IV administration maximum rate permitted is 0.2 mg/kg/minute.

8. Labetalol

Use: Hypertension, used IV in hypertensive emergencies.

Dosage:

PO; 4 mg/kg/day in 2 divided doses (Max: 40 mg/day).

IV: Starting dose 0.2-1 mg/kg/dose (Max: 20 mg/dose). Continuous infusion: 0.4-1 mg/kg/hr (Max: 3 mg/kg/hr).

Brands: 10 mg Tab, 5 mg/ml Inj; Lobet. 50, 100 and 200 mg Cap; Normadate.

- Contraindicated in asthma, uncomplicated CHF, bradycardia, pulmonary edema.

9. Methyldopa

Use: Hypertension.

Dosage: Start at 10 mg/kg/day divided 2-4 hourly, may be increased every 2 days if required to a maximum dose of 65 mg/kg/day.

Brands: 250 mg Tab; Alphadopa, Amdopa, Sembrina.

10. Metoprolol

Use: Hypertension, arrhythmias, idiopathic hypertrophic subaortic stenosis, migraine prophylaxis.

Dosage: PO; 1-5 mg/kg/day.

Brands: 25, 50 and 100 mg Tab; Betaloc, Metolar, Topol-XL.

- Abrupt discontinuation should be avoided. Contraindicated in sinus bradycardia, CHF, cardiogenic shock.

11. Minoxidil

Use: Hypertension, topically for alopecia (male pattern).

Dosage:

- Hypertension: PO; Start at 0.1-0.2 mg/kg single dose; Max: 5 mg/day; can be increased every 3 day to 0.25-1 mg/kg/day in 2 divided doses to a maximum of 50 mg/day.
- Alopecia: Apply twice daily.

Brands: 2.5, 5 and 10 mg Tab; Loniten. 2 and 5% solution; Coverit, Pilagro, Regrow.

- Minoxidil use should be reserved for patients not responding to maximum dose of diuretics and 2 other antihypertensive agents. May cause pericarditis, pericardial effusion and tamponade.

12. Nifedipine

Use: Hypertension, hypertrophic cardiomyopathy.

Dosage: PO; SL:

- Infants and Children: 0.25-0.5 mg/kg/dose (Max: 10 mg/dose or 1-2mg/kg/day).
- Hypertrophic cardiomyopathy: 0.6-0.9 mg/kg/day in 3-4 divided doses.

Brands: 5 mg Cap., 10 and 20 mg Tab; Angioblock, Cardipin, Depin, Myogard.

- More rapid effect is seen if drug is administered empty stomach. May lead to hypotension, tachycardia, flushing. Concurrent beta blocker use may lead to increase in cardiovascular side effects. Nifedipine increases phenytoin, digoxin and cyclosporine serum levels.

13. Nitroprusside

Use: Hypertensive crises, CHF, controlled hypotension during anesthesia.

Dosage: IV, Initial dose is 0.3-0.5 mcg/kg/minute, titrate to a desired effect up to maximum dose of 8 mcg/kg/minute.

Brands: 50 mg/ml Inj; Nipress, Pruside, Sonide.

Administration: Dry powder for injection should only be dissolved in 5% dextrose water and should be protected from light. Left over should be discarded after 24 hr of reconstitution. Overdose or prolonged use may lead to cyanide or thiocyanate toxicity.

14. Phenoxybenzamine

Use: Symptomatic treatment of sweating and HT in patient with pheochromocytoma.

Dosage: PO; 0.2-2 mg/kg/day as single dose.

Brands: Fenoxene 10 mg Cap and 50 mg/ml Inj.

- May cause nasal congestion, dizziness, constricted pupils.

15. Phentolamine

Use: Diagnosis and treatment of pheochromocytoma, used locally for extravasation of drugs with alpha adrenergic effects (dopamine, dobutamine, epinephrine, phenylephrine).

Dosage:

- Extravasation: Dilute 2.5-5 mg in 10 ml NS and then infiltrate by multiple injections (Max: 0.1 mg/kg).
- Pheochromocytoma: IM, IV: 0.05-1 mg/kg/dose (Max: 5 mg).

Brands: Fentanor 10 mg/ml Inj.

16. Prazosin

Use: Hypertension, severe CHF.

Dosage: PO; 0.1 mg/kg/dose q 6 hr, can be increased slowly up to a maximum dose of 0.4 mg/kg/day.

Brands: 2.5 and 5 mg Tab; Minipress, Prazocip XL, Prazopress.

- First dose of a drug may cause marked hypotension, syncope and loss of consiousness. This effect is more commonly seen in patient of salt or water depletion, receiving beta blocker, diuretics.

17. Propranolol

Use: Hypertension, arrhythmias, tetrology of fallot cyanotic spells, migraine prophylaxis and short term adjunctive therapy of thyrotoxicosis.

Dosage:

- Hypertension, Arrhythmias: PO; 0.5-1 mg/kg/day divided 6-8 hr, titrated slowly upward up to 2-5 mg/kg/day. IV: 0.01-0.1 mg/kg/dose to be given over 15 minutes; Maximum dose 1 mg in infants and 3 mg in children.
- Migraine prophylaxis: PO; 0.6-1.5 mg/kg/day divided q 6-8 hr (Max: 4 mg/kg/day).
- Tetrology Spells: Starting is 1-2 mg/kg/dose every 6 hr., can be titrated upward slowly every 24 hour to maximum of 5 mg/kg/day.
- Thyrotoxicosis: PO; 2 mg/kg/day divided q 6-12 hr.

Brands: 10, 40 and 80 mg Tab; Ciplar, Inderal. 1 mg/ml Inj; Properol.

- Give IV slowly at a rate of 1 mg/minute. Taper slowly over 2 weeks. Not indicated in patients with CHF, bradycardia, heart block, asthma. Cimetidine, Ciprofloxacin, Fluconazole, Isoniazid,Theophylline may increase propranolol levels and toxicity.

18. Verapamil

Use: Hypertension, supraventricular tachyarrhythmias.

Dosage: Not indicated below 2 years of age.

- IV: 0.1-0.2 mg/kg/dose (Max: 5 mg/dose). Second dose can be repeated after 30 min if required.
- PO; 4-8 mg/kg/day divided q 8 hr.

Brands: 40 and 80 mg Tab; Vasopten, Veramil. 25 mg/ml Inj., Calaptin, VPL.

Administration: Monitor BP and ECG during IV use. Calcium Chloride should be ready to treat hypotension if occurs.

15 CHAPTER

Antileprotics

1. Clofazimine

Use: Multibacillary dapsone sensitive leprosy, lepromatous leprosy, erythema nodosum leprosum.

Dosage: PO; 1 mg/kg/day; maximum 50 mg/day for daily schedule and 4 mg/kg, maximum 300 mg for once monthly doses. Given in combination with dapsone and rifampicin.

Brands: 50 and 100 mg Cap; Clofozine, Hansepran.

- May discolor skin, conjunctiva, tears, sweat. Use with caution in patient with gastrointestinal problems.

2. Dapsone

Use: Leprosy, dermatitis herpetiformis, prophylaxis against Pneumocystis carinii pneumonia as an alternative drug.

Dosage: PO; 1-2 mg/kg/day once daily in combination with other agents (Max: 100 mg/day).

Brands: 25, 50 and 100 mg Tab; Dapsone, Navophone.

- Contraindicated in G6PD deficiency. May cause hemolysis, leukopenia, cholestatic jaundice, photosensitivity.

3. Rifampicin

See under antitubercular drugs.

16 CHAPTER

Antimalarials

1. Arteether

Use: Severe and complicated malaria including cerebral malaria caused by *Plasmodium falciparum*.

Dosage: IM: 3 mg/kg/day once daily for 3 days.

Brands: 75 mg/ml Inj. containing α and β-arteether; E-mal, Falcigard, Match, Rapither.

2. Artemether

Use: Severe falciparum malaria, cerebral malaria, multidrug resistant malaria.

Dosage:

- Severe malaria: IM, PO: 3.2 mg/kg loading dose on first day, followed by 1.6 mg/kg daily for 6 days (Max total: 9.6 mg/kg). This course should be followed by 2nd line drug for 7 days.
- Uncomplicated malaria: PO; 4 mg/kg once a day for 3 days plus mefloquine as single dose on second or third day.

Brands: 40 and 80 mg Cap; 80 mg/ml Inj; Larither, Malither, Paluther.

3. Artemether and Lumefantrine

Use: Treatment of *P. falciparum* malaria or mixed infection including *P. falciparum*.

Dosage: PO; Artemether and Lumefantrine is available in fixed combination ratio of 1:6. Dose can be calculated by artemether content, i.e. 4 mg/kg/day in two divided doses for 3 days.

New and recrudescent infection can be treated with a second course.

Brands: 20+120/5 ml Syrup; 20+120, 40+240, 80+480 Tab; Lumerax, Lumart.

- May cause HA, dizziness, myalgia, abdominal pain.

4. Artesunate

Use: Severe malaria and chloroquine resistant falciparum malaria.

Dosage:

- Severe malaria: IM, IV: Loading dose of 2.4 mg/kg as a single dose followed by 1.2 mg/kg/dose at 12 and 24 hr, then 1.2 mg/kg/day for 6 days. If patient can take orally shift to oral formulation in a dose of 2 mg/kg/day. This should be followed by second line drug for 7 days.
- Uncomplicated malaria: PO; 4 mg/kg single dose on day 1, followed by 2 mg/kg daily for 4 days plus mefloquine single dose on 2nd or 3rd day.

Brands: 50 mg Tab; 60 mg Vial; Falcigo, Falciquine, Ulteria.

Administration: 60 mg dry powder for injection is dissolved in 0.6 ml of 5% sodium bicarbonate, this is then diluted to 3-5 ml with 5% dextrose and give immediately by IV bolus.

- Antagonistic effect is seen if used along with pyrimethamine and sulfonamides.

5. Chloroquine

Use: Chemoprophylaxis in sensitive areas, treatment of uncomplicated malaria due to susceptible *Plasmodium species*, extraintestinal amoebiasis.

Dosage:

- Acute attack: PO; 10 mg base/kg loading dose followed by 5 mg/kg after 6 hr and then at 24 and 48 hr (Total dose: 25 mg/kg) IM: 5 mg base/kg (Max: 200 mg base); may be repeated after 6 hr (Max: 10 mg/kg/day).
- Malaria prophylaxis: PO; 5 mg base/kg/week on the same day each week; start 1-2 weeks before exposure and continue for 4 weeks after leaving an endemic area (Max: 300 mg base/wk).
- Extraintestinal amoebiasis: PO; 10 mg base/kg/day single dose for 2-3 weeks (Max: 300 mg base/day).

Brands: 250 and 500 mg Tab; (base is 150 and 300), 50 mg/5 ml Syrup; 40 mg/ml Inj; Cloquin, Emquine, Nivaquin-P, Resochin.

- Parenteral dose should not exceed 5 mg base/kg. Use with caution in liver disease, seizure disorder, auditory damage, psoriasis, G6PD deficiency should not be given empty stomach and in high fever. If vomiting occur within 45 minutes of a dose, that particular dose is to be repeated after taking care of vomiting.

6. Mefloquine

Use: Treatment and prophylaxis of falciparum malaria.

Dosage: PO;

- Treatment: Loading dose of 15 mg base/kg as single dose followed by 10 mg/kg 8-12 hr later for 1 day (Max: 500 mg).
- Chemoprophylaxis: 5 mg base/kg weekly (Max: 250 mg/week). Started 1 week before and continued for 4 week after last exposure.

Brands: 250 mg Tab; Mefax, Meff, Mefque.

- May cause anxiety, hallucination, bradycardia, sinus arrhythmias.

7. Primaquine

Use: Radical cure and prevention of relapse in vivax and ovale malaria. In case of falciparum it may be given for terminal prophylaxis.

Dosage: PO; Radical cure; For vivax and ovale only. 0.3 mg base/kg/day for 14 days as single daily dose; after an adequate course of chloroquine (Max: 15 mg). Terminal prophylaxis/ gametocytocidal action in falciparum: 0.7 mg of base/kg as single dose.

Brands: 2.5, 7.5 and 15 mg Tab; Leoprime, Malarid.

- Use with caution in G6PD deficiency, in cases of borderline deficiency once weekly dose of 0.6-0.8 mg/ kg is given for 6 weeks. Should not be given along with other drugs causing hematological disorders, e.g. Chloromycetin, Sulphadoxine + Pyrimethamine.

8. Pyrimethamine and Sulphadoxine

Use: Prophylaxis and treatment of malaria.

Dosage: PO

- Acute attack: 1 mg/kg of PM or 20 mg/kg of SD as single dose on last day of quinine therapy.
- Malaria prophylaxis: Not recommended due to side effects. Started 2 week before entering the endemic area where chloroquine resistant falciparum exists. 2-12 months. 1/4 Tab; 1-3 yr: 1/2 Tab; 4-8 yr: 1 Tab; 9-14 yr: 2 Tab; > 14 yr: 3 Tab.

Brands: PM 25 mg +SD 500 mg Tab and PM 12.5 mg + SD 250 mg/5 ml Susp; Pyralfin, Reziz.

- Use with precautions in folate deficiency, asthma, seizure disorder, G6PD deficiency. Contraindicated in

megaloblastic anemia, renal insufficiency, < 2 mth of age. Folic acid supplements should be delayed for 1 week after PM and SD treatment to avoid inhibitory effect on antimalarial efficacy.

9. Quinine

Use: Chloroquine resistant falciparum malaria, severe complicated falciparum malaria.

Dosage: PO; as quinine sulphate: 30 mg/kg/day divided q 8 hr for 7 days. IV, as quinine dihydrochloride: 20 mg/kg loading dose over 4 hr, then 10 mg/kg over 4 hr; every 8 hourly, until can be given orally, for 7-10 days (Max: 1800 mg/day). Quinine should always be used in combination with second line antimalarial drugs. For example:

Tetracycline: 5 mg/kg q 6 hr for 7 days.

Clindamycin: 20-40 mg/kg/day divided q 8 hr for 5 days.

Doxycycline: 3 mg/kg twice a day for 7 days.

Pyrimethamine + Sulphadoxine: 1 mg/kg of pyrimethamine or 20 mg/kg of sulphadoxine.

Tetra and doxycycline are not indicated in < 8 years of age. Single dose of primaquine is given at the end of therapy as quinine is not effective against gametocytes of falciparum.

Brands: 150 mg/5 ml Susp; 100, 300 and 600 mg Tab; 300 mg/ml Inj; Cinkona, QST, Quinorsol.

Administration: IV dose should be given diluted in 5-10% dextrose in a concentration of 1 mg/ml. 12 mg of dihydrochloride salt is equivalent to 10 mg base, maintenance dose is started after 12 hr of loading dose.

- May cause cinconism, hypoglycemia, hypotension.

17 CHAPTER

Antimyasthenics

1. Edrophonium

Use: Diagnosis of myasthenia gravis.

Dosage: IV:

- Infants: Initial dose of 0.1 mg, if no response then followed by 0.4 mg, total dose is 0.5 mg.
- Children: 0.04 mg/kg given over 1 minute, if no response within 45 seconds then followed by 0.16 mg/kg (Max: 10 mg total).

Brands: 10 mg ampoule; Tensilon.

- May cause arrhythmias, hypotension, seizures, drowsiness, laryngospasm, bronchospasm, diaphoresis. Keep atropine ready for treatment of cholinergic crises resulting from overdoses.

2. Neostigmine

Use: Treatment of myasthenia gravis, reversal of non-depolarizing neuromuscular blocking agents.

Dosage:

- Myasthenia gravis: Diagnosis: IM, 0.025-0.04 mg/kg as a single dose. Treatment: IM, SC; 0.01-0.04 mg/kg q 2-4 hr and oral dose is 2 mg/kg/day q 3-4 hr (Max: 375 mg/day).

- Reversal of nondepolarizing neuromuscular blockade: 0.025-0.1 mg/kg/dose (total dose: 5 mg). Use in conjunction with atropine or glycopyrrolate.

Brands: 15 mg Tab; Prostigmin, Tilstigmin. 0.5 mg Inj; Myostigmin, Prostigmin.

- Does not antagonize succinylcholine. Use with caution in patients of epilepsy, bradycardia, hypothyroidism, asthma.

3. Pyridostigmine

Use: Treatment of myasthenia gravis, reversal of neuromuscular blocking agents.

Dosage:

- Myasthenia gravis: In children 7 mg/kg/day in 5-6 divided doses.
- Reversal of nondepolarizing neuromuscular blockade: 0.1-0.25 mg/kg/dose preceded by atropine or glycopyrrolate.

Brands: 30 and 60 mg Tab, Myestin.

- May cause seizures, headache, bradycardia, salivation, miosis, urinary frequency.

18 CHAPTER

Antiprotozoals

1. Amphotericin-B

See under antifungal.

2. Chloroquine:

See under antimalarial.

3. Metronidazole

Use: Amoebiasis, giardiasis, trichomoniasis, SSTI, CNS infection, intra-abdominal infection, systemic anaerobic infections.

Dosage:

- Amoebiasis: PO: 35-50 mg/kg/day divided q 8 hr for 10 days.
- Other parasites: PO: 15-30 mg/kg/day divided q 8 hr.
- Anaerobic infection: PO, IV: 30 mg/kg/day divided q 6 hr (Max: 4g/day).

Brands: 200 and 400 mg Tab; 200 mg/5 ml Susp; Aristogyl, Flagyl, Metrogyl. 5 mg/ml Infusion; Flagyl, Metron.

Combinations: : Metronidazole + Diloxinate Furate; 400 + 500 mg Tab; 200 + 250 mg Susp; Entamizole. Metronidazole + Furazolidone; 100 + 300 mg Tab; 75 + 250 mg Susp; Metrogyl-F. Metronidazole + Furazolidone; 100 + 300 mg Tab; 25 + 75 mg Susp; Dependal-M.

- May cause metallic taste, nausea. Administer IV slowly over 1/2-1 hr.

4. Nitazoxanide

Use: Amoebiasis, giardiasis, helminth infections.

Dosage: PO; 1-4 yr: 100 mg BD; 4-10 yr: 200 mg BD; > 10 yr: 500 mg BD for 3 days.

Brands: 200 and 500 mg Tab; 100 mg/5 ml Syrup; Nitacure, Nizonide, Nixide.

Combinations:

Nitazoxanide + Ofloxacin 500 + 200 mg Tab, 50 + 100 mg/5 ml Syrup: Nitazet-O, Nizonide-O.

- Avoid in < 1 yr. May cause increase in SGPT and creatinine, dizziness, discolored urine and pale yellow eyes.

5. Ornidazole

Use: Acute intestinal and extraintestinal amoebiasis, giardiasis, anaerobic infections.

Dosage: PO: 40 mg/kg once a day; 3 days for amoebiasis and 2 days for giardiasis.

Brands: 500 mg Tab; 125 mg/5 ml Susp; 5 mg/ml Infusion; Dazolic, Ornida.

6. Pentamidine

Use: Visceral leishmaniasis, *P. carinii pneumonia* prevention and treatment.

Dosage: IV, IM:

- *P. carinii pneumonia* treatment: 4 mg/kg/day OD for 14 days and for prophylaxis 4 mg/kg/dose q 2-4 wk.
- Leishmaniasis: 2-4 mg/kg/day OD for 15 days.

Brands: 300 mg Vial; Pentacarinate, Pentam.

- Vancomycin, Aminoglycoside and Amphotericin-B may cause additive toxicity. Give IV slowly over a period of 1 hr in a concentration of 6 mg/ml.

7. Secnidazole

Use: Amoebiasis and giardiasis.

Dosage: 30 mg/kg single dose (Max: 2 gm).

Brands: 500 mg and 1 gm Tab; Ambiform, Etisec, Secnil, Seczol.

8. Sodium Stibogluconate

Use: Leishmaniasis.

Dosage: IV, IM: 20 mg/kg/day for 20 days in LCL and DCL and 28 days for ML and VL. Repeated courses may be required in patients with severe cutaneous lesions, ML or VL cases.

Brands: 100 mg Inj; Sodium Stibogluconate.

- May cause myalgias, arthralgias, abdominal discomfort, elevated liver enzymes and hematologic changes.

9. Tinidazole

Use: Giardiasis and amoebiasis.

Dosage:

- Amoebiasis: 60 mg/kg/day single dose for 3 days.
- Giardiasis: 50 mg/kg single dose once.

Brands: 300 and 500 mg Tab; Fasigyn, Tini, Tiniba. 150 mg/5 ml Susp; Tini.

- May cause metallic taste, dark urine, neuropathy, seizures, leukopenia.

19 CHAPTER Antipsychotics/ Anxiolytics/Sedatives

1. Chlordiazepoxide

Use: Anxiety, preanesthetic medication, behavioral disorders, emotional disturbances.

Dosage: 0.3-0.5 mg/kg/day in divided doses.

Brands: 10 and 25 mg Tab; Dibrium, Librium.

- May cause drowsiness, dizziness, drug dependence.

2. Chlorpromazine

Use: Nausea and vomiting, mania, behavioral problems, neonatal tetanus, to relieve restlessness and apprehension prior to surgery.

Dosage: PO; IM, IV: 0.5-1mg/kg/dose q 6-8 hr. In neonatal tetanus more frequent dosing can be used.

Brands: 25, 50 and 100 mg Tab; 25 mg/ml Inj; Megatil, Chlorpromazine.

- May cause hypotension with IV use, tachycardia, extrapyramidal reactions, rash, dry mouth, constipation.

3. Haloperidol

Use: Psychosis, severe behavioral problems, sedation, choreiform movements.

Dosage:

- 3-12 yr: PO; Initial dose of 0.25-0.5 mg/day given in divided doses, can be increased by 0.25-0.5 mg q week to maximum of 0.15 mg/kg/day.
- 6-12 yr: IM: 1-3 mg/dose q 6-8 hr (Max: 0.15 mg/kg/day).

Brands: 0.25, 1.5 and 5 mg Tab; Depidol, Halidol, Serenace. 50 mg/ml Inj; Depidol-LA.

- May cause tachycardia, hypo- and hypertension, sweating, extrapyramidal reactions, bronchospasm, seizures, visual disturbances, leukopenia, anemia.

4. Thioridazine

Use: Psychotic disorders, depressive neurosis, behavioral problems.

Dosage: PO; 0.5-3 mg/kg/day divided q 8 hr.

Brands: 10, 25 and 50 mg Tab; Delnil, Ridazin, Thioril.

- Use with caution in patients of cardiovascular problems and seizures.

5. Triclofos

Use: Insomnia, as sedative in convulsions, recurrent colic.

Dosage: PO; 20 mg/kg/dose.

Brands: 500 mg/5 ml Syrup; Pedicloryl, Pedicalm.

- May cause rash, nausea, GI disturbances.

6. Trifluoperazine

Use: Hallucination, delusions, schizophrenia.

Dosage: PO in 6-12 years of age group. 1 mg/day in 2 divided doses can be increased gradually to required effect (Max: 15 mg/day).

Brands: 1 and 5 mg Tab; Schizonil, Trinicalm. 5 and 10 mg Tab; Neocalm, Trazine.

Combinations: Trifluoperazine + Isopropamide: 1 + 5 mg Tab; Gastabid, Stelbid.

- May cause hypotension, arrhythmias, dystonias, constipation, dry mouth.

20 CHAPTER

Antiretrovirals

These agents are used for treatment of HIV infection.

NUCLEOSIDE/NUCLEOTIDE REVERSE TRANSCRIPTASE INHIBITORS

Common side effects are nausea, vomiting, rash, discoloration, fever, anorexia, diarrhea, headache, bone marrow suppression; less common side effect are hypersensitivity, lactic acidosis, hepatic steatosis, pancreatitis, peripheral neuropathy, retinal depigmentation.

1. Abacavir

Dosage: PO: Children>3 mth and < 50 kg; 8 mg/kg q 12 hr. Children > 50 kg; 20 mg/kg q 12 hr (Max: 300 mg/dose).

Brands: 300 mg Tab; Abamune, Abavir.

2. Didanosine

Dosage: PO: Children 2 wk to 8 mth: 50-100 mg/m^2/day divided q 12 hr. 8 mth to 13 yr: 120 mg/m^2/day divided q 12 hr. > 13 yr: 125 mg BD.

Brands: 25, 50 and 100 mg Tab; Dinex. 250 mg Cap; Dinex, Virosine-DR.

- Food decreases bioavailability, antacids and gastric acid antagonist may increase bioavailability.

3. Lamivudine

Dosage: PO: Neonates < 30 days; 2 mg/kg/dose twice daily. Infants and children: 4 mg/kg/dose twice daily (Max: 300 mg/day).

Brands: 150 and 300 mg Tab; Heptavir, Lamuvid. 50 mg/5 ml Syp; Lamivir.

Combinations:

- Lamivudine + Stavudine: 150 + 30 and 150 + 40 Tab; Lamistar.
- Lamivudine + Zidovudine: 150 + 300 mg Tab; Combivir.

Combination with Zidovudine prevent its resistance.

4. Stavudine

Dosage: PO: < 30 kg; 2 mg/kg/day divided q 12 hr. 30-60 kg; 30 mg twice daily.

Brands: 30 and 40 mg Tab; Virostav. 30 and 40 mg Cap; Stag, Stavir.

- Combination with Zidovudine should not be used as it antagonizes the effect.

5. Zidovudine

Dosage: PO:

- Prophylaxis: Premature infants; 4 mg/kg/day divided q 12 hr. for up to 4 wk, then q 8 hr. Term neonates; 8 mg/kg/day divided q 6 hr.
- Treatment: Children 6 wk to 12 yr; 480 mg/m^2/day divided q 8 hr. Adolescents; 200 mg thrice daily.

NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS

1. Efavirenz

Dosage: PO: Children > 3 yr; 10-15 kg: 200 mg; 15-20 kg: 250 mg; 20-25 kg: 300 mg; 25-32.5 kg: 350 mg; 32.5-40 kg: 400 mg; > 40 kg: 600 mg; given once daily.

Brands: 200 mg Tab; Viranz. 200 and 600 mg Cap; Efavir, Efferven.

2. Nevirapine

Dosage: PO:

- Neonates: 240 mg/m^2/day once daily for 14 days, then same dose divided q 12 hr for next 14 days, followed by 400 mg/m^2/day divided q 12 hr.
- Childrens: 4 mg/kg once daily for 14 days (Max: 400 mg/day).

Brands: 200 mg Tab; Neve, Nevimune. 50 mg/5 ml Syp; Nevimune.

- Should not be given with fatty foods.

PROTEASE INHIBITORS

These agents may cause hyperglycemia, hyperlipidemia, lipodystrophy, increases bleeding tendency, increase in liver enzymes, bone marrow suppression, nephritis, nephrolithiasis, hepatitis, etc.

1. Amprenavir

Dosage: PO: Children 4-16 yr and wt < 50 kg; 22.5 mg/kg BD.

2. Indinavir

Dosage: PO: 1500 mg/m^2/day divided q 8 hr.

Brands: 400 mg Tab; Virodin. 400 mg Cap; Indivan, Indivir.

- Avoid fatty meals, drink plenty of fluid daily to resolve drug induced renal colic due to nephrolithiasis.

3. Lopinavir

Dosage: PO: <40 kg; 40 mg/kg/day divided q 12 hr. > 40 kg; 800 mg/day divided q 12 hr.

Brands: Lopnavir + Ritonavir: 133.3 + 33.3 mg Cap; Lupimune, Ritomax-L.

4. Nelfinavir

Dosage: PO (investigational):

- Neonates and Children < 2 yr: 30 mg/kg/day divided q 8 hr.
- Children 2-13 yr: 60-100 mg/kg/day divided q 8 hr.

Administer with meal to optimize absorption.

Brands: 250 mg Tab; NEL, Nelfin.

5. Ritonavir

Dosage: PO: 400 mg/m^2/day divided q 12 hr; titrate upward in 50 mg/m^2/dose increment to 800 mg/m^2/day divided q 12 hr.

Brands: 100 mg Cap; Ritomax, Ritomune.

- Adminster with food.

21 CHAPTER

Antitubercular

1. Cycloserine

Use: Adjunctive treatment in pulmonary and extra-pulmonary TB.

Dosage: 10-20 mg/kg/day divided q 12 hr (Max dose: 1000 mg/day).

Brands: 250 mg Cap; Coxerin, Cyclorine, Myser.

- Contraindicated in epilepsy, depression, anxiety, confusion. May increase daily requirement of vitamin B_{12} and folic acid. Concomitant use of pyridoxine may prevent neurotoxic effects.

2. Ethambutol

Use: *M. tuberculosis* and other mycobacterial diseases.

Dosage: 15-20 mg/kg/day once daily (Max: 1000 mg/day).

Brands: 200, 400 and 800 mg Tab; Albutol, Combutol, Mycobutol, Themibutol.

- May cause optic and retrobulbar neuritis, hepatotoxicity. Those children whose visual acuity can be determined accurately should be given ethambutol.

3. Ethionamide

Use: *M. tuberculosis* and other mycobacterial diseases.

Dosage: 15-20 mg/kg/day once daily (Max: 1000 mg/day).

Brands: 250 mg Tab; Ethide, Ethomid, Myobit.

- May cause hepatotoxicity, peripheral neuropathy, tremor and optic neuritis. If used along with cycloserine and isoniazid may increase nervous system adverse effects. Administer with pyridoxine to prevent neurotoxic effects.

4. Isoniazid

Use: *M. tuberculosis.*

Dosage: 5-10 mg/kg/day once daily (Max: 300 mg/day).

Brands: 100 and 300 mg Tab; Isonex, Solonex. 100 mg/5 ml Susp; Siozide.

- May cause hepatitis, peripheral neuropathy, dizziness, seizures. Administer 1 hr before or 2 hr after meals. Advice patients to report prodromal symptoms of hepatitis, tingling or numbness of extremities.

5. Para-aminosalicylic Acid

Use: *M. tuberculosis.*

Dosage: 200-300 mg/kg/day divided q 8 hr.

Brands: 1 gm Tab; Monospas.

- May cause hepatitis, hypokalemia, leukopenia and goitrous hypothyroidism.

6. Pyrazinamide

Use: *M. tuberculosis.*

Dosage: 30-35 mg/kg/day once daily (Max: 1000 mg/day).

Brands: 500, 750 and 1000 mg Tab; Cavizide, Pyzina, PZA-CIBA. 250 mg/5 ml Syrup; PZA-CIBA.

- May cause arthralgia, hepatotoxicity, gout.

7. Rifampicin

Use: *M. tuberculosis*; Meningococcal and *H. influenzae* prophylaxis.

Dosage:

- Tuberculosis: 10 mg/kg/day empty stomach single dose.
- Meningococcal Prophylaxis: In neonates 10 mg/kg/day divided q 12 hr; in infants and children 20 mg/kg/day divided q 12 hr for 2 days.
- *H. influenzae* prophylaxis: In neonates 10 mg/kg/day once daily and in infants and children 20 mg/kg/day once daily for 4 days.

Brands: 150, 300 and 450 mg Cap; R-cin, Rimactane, Ticin. 100 mg/5 ml Susp; R-cin, Rimactane, Rimpin.

- May cause hepatotoxicity, gastritis, flu like illness. May discolor urine, sweat, tears and other body fluid to red orange color.

8. Amikacin, Clarithromycin, Kanamycin, Quinolones, Streptomycin are also Used for Tuberculosis

For details see under respective section.

22 CHAPTER

Antispasmodics

1. Dicyclomine

Use: Functional disturbances of GI motility.

Dosage: PO; Infants > 6 mth, 5 mg/dose 3-4 times/day; Children, 10 mg/dose 3-4 times/day. IM: 20 mg/dose.

Brands: 20 mg Tab; Coligon. 10 mg/ml Inj; Centwin, Clomin.

Combinations:

Dicyclomine 20 mg + PCM 500 mg Tab; Spasmoflexon, Spasmax.

Dicyclomine 20 mg + Diclofenac 50 mg Tab; Cataspa, Onaspas.

Dicyclomine 10 mg + Dimethicone 40 mg: Per ml drop and per 5 ml Susp; Colimex.

- Contraindicated in GI obstruction, tachycardia, urinary tract obstruction and infant < 6 mth of age. Children of Down's syndrome, spastic paralysis or brain damage are more susceptible to adverse effects.

2. Drotaverine

Use: As spasmolytic in nephrolithiasis, cholelithiasis, spastic constipation.

Dosage: 1-5 yr: 20 mg 3 times/day; 6-12 yr: 40 mg 3 times/day.

Brands: 40 and 30 mg Tab; Dotarin, Drotin, Drot. 20 mg/ml Inj; Drot, Tavan.

3. Hyoscine Butylbromide

Use: Spasmodic GI tract disorders, adjunctive therapy of peptic ulcer, hypermotility of lower urinary tract, infant colic.

Dosage: PO; Children > 6 yr, 10-20 mg, 3 times/day. Inj; 5 mg 3 times/day.

Brands: 10 mg Tab; 20 mg/ml Inj; 7.5 and 10 mg Suppository; Buscopan.

- Contraindicated in megacolon, GI mechanical stenosis, tachycardia.

4. Propantheline Bromide

Use: Adjunctive therapy of pancreatitis, ureteral and urinary bladder spasm, peptic ulcer.

Dosage: 1-2 mg/kg/day in 3-4 divided doses.

Brands: 15 mg Tab; Probanthine, Spastheline.

23 CHAPTER

Antitoxins

1. Anti-snake Venom

Use: Snake bite along with required medical management.

Dosage: IV; Mild cases: 5 vials. Moderate cases: 5-15 vials. Severe cases: 15-20 vials. Smaller children may require higher dose due to large dose of venom injected per unit body weight.

Brands: Available in lyophilized form and neutralizes Cobra, Russel's viper, Sawscaled viper and krait venom. 10 ml Polyvalent Inj; by BE, Bharat serum, Haffkine.

Administration: If time permits, do exclude equine serum allergy by intradermal injection of 0.02 ml of 1:10 diluted antivenom. The antivenom is given diluted in 250 ml of normal saline at a rate of 20 ml/kg/hr.

2. Diphtheria Antitoxin/Antidiphtheric Serum (ADS)

Use: Diphtheria along with required medical management.

Dosage: Doses remain same in all age groups IV.

- Nasal diphtheria: 20,000 IU.
- Tonsillar and pharyngeal diphtheria: 40,000-80,000 IU.
- Laryngeal diphtheria: 120,000 IU.
- Severe disease of 3 days or more with neck swelling: 80,000-120,000 IU.

Brands: Enzyme refined globulin solution 10,000 IU/vial by Haffkine.

Administration: Test for hypersensitivity. Amount to be given is diluted in 1:20 isotonic normal saline and given at the rate of 1 ml/minute.

- Diphtheria immunoglobulin (DIG) can be used in place of ADS in a dose of 0.6 ml/kg.

3. Gas Gangrene Antitoxin

Use: Gas gangrene infection caused by Clostridia bacteria.

Dosage: IV, IM, SC: 30,000-75,000 IU.

Brands: 10,000 IU/Vial; AGGS by Bharat serum.

4. Tetanus Antitoxin

Use: Prophylaxis and treatment of tetanus in cases where tetanus immunoglobulin is not available.

Dosage: IM, SC:

- Prophylaxis, <30 kg: 1500 units. > 30 kg: 3000-5000 units
- Treatment; 50,000-100,000 units.

Brands: 750, 1500, 5000, 10000, 20000, 50000 IU Inj; by Bengal immunity. 1500, 10000, 20000, IU Inj; by Haffkine.

Administration: Should be given after sensitivity test. For treatment given half IV and half IM.

24 CHAPTER

Antiulcers/ Antisecretory

1. Proton Pump Inhibitor

These agents decrease gastric acid secretion by selectively inhibiting the proton pump, also demonstrate activity against *H. pylori*. These agents may cause constipation, headache, abdominal pain, dizziness, rash, leukopenia. Useful for duodenal ulcers, erosive gastritis, esophagitis, hypersecretory conditions, prevention and treatment of NSAIDs associated gastric ulcers, adjuvant therapy in the treatment of *H. pylori* infection. Administer before eating. Also available in combination with domperidone.

a. Lansoprazole

Dosage: PO; 0.5 mg/kg once daily in > 1 yr of age.

Brands: 15 and 30 mg Cap; Lan, Lanzap, Lanzol

- Decreases vitamin B_{12} absorption.

b. Omeprazole

Dosage: PO in > 2 yr of age; 0.6-0.7 mg/kg once daily. Titrate to desired effect.

Brands: 10 and 20 mg Cap; Lomac, lomecid, Ocid.

c. Pantoprazole

Dosage: PO in > 6 yr of age; 0.5 mg/kg once daily.

Brands: 20 and 40 mg Tab; Lupipan, Pan, Pantocid.

2. Sucralfate

Use: Duodenal and gastric ulcer, prevention of stress ulcer, NSAIDs associated mucosal damage, topically for chemotherapy induced stomatitis, burns.

Dosage:

- PO; 40 - 80 mg/kg/day divided q 6 hr.
- Stomatitis: 5-10 ml of 1 gm/10 ml, Swish and spit or swish and swallow 4 times/day.

Brands: 0.5 gm/5 ml; Sucral kid, Pepsigard-p. 1 gm/5 ml Syrup; Pepsigard, Sucral. 1 gm Tab; Pepsigard, Sucral.

- Interferes with absorption of vitamin A, D, E and K may cause constipation, dry mouth, hypophosphatemia, vertigo, headache.

25 CHAPTER

Antivirals

1. Acyclovir

Use: Cutaneous herpes simplex, HSV encephalitis, HZV infection, varicella zoster.

Dosage:

- Neonatal herpes: 20 mg/kg/dose q 8 hr IV for 14-21 day.
- HSV encephalitis: 10-20 mg/kg/dose q 8 hr IV for 14-21 day.
- Genital herpes: PO: 40-80 mg/kg/day divided q 8 hr for 5-7 day.
- Recurrent or suppression of genital herpes: 40-80 mg/kg/day divided q 8 hr for 12 mth.
- Varicella zoster, initiate treatment within 24 hr of onset of rash: PO: 20 mg/kg/dose, 4 times/day for 5 day.

Brands: 200, 400, 800 mg Tab; 25 mg/ml Inj; Acivir, Axovir.

- Incompatible with blood products and protein containing solutions. Adequate hydration should be maintained during therapy. Administer slowly to prevent renal damage. Use with caution in liver disease and epilepsy. Do not refrigerate solution because it can cause precipitation of the drug.

2. Amantadine

Use: Prophylaxis and treatment of influenza-A virus infection.

Dosage: PO: 5 mg/kg/day divided q 12 hr. Max 150 mg/day in 1-9 yr and 200 mg/day in 10-20 yr of age group.

Brands: 100 mg Cap; Amantrel, Neaman.

- Administer within 24-48 hr of onset of symptoms and duration of treatment is 2-5 day.

3. Cedofovir

Use: CMV retinitis; CMV, HSV, VZV infections resistant to first line drug; recurrent respiratory papillomatosis.

Dosage: IV: For CMV retinitis: 5 mg/kg/dose once by slow infusion.

- Oral probenecid must be accompanied before and after IV cedofovir along with adequate NS hydration.

4. Famciclovir

Use: HSV and VZV infection.

Dosage: Can be used in older children in a dose of 200-500 mg/day for 5-7 day.

Brands: 250 and 500 mg Tab; Famtrex, Penvir, Virovir.

- May cause urinary retention, hypotension, electrolyte imbalance.

5. Foscarnet

Use: Treatment of CMV, VZV infection resistant to first line drug; CMV retinitis.

Dosage:

- CMV retinitis: Induction; 180 mg/kg/day divided q 8 hr for 14-21 day. Maintenance; 90-120 mg/kg/day once daily.
- Resistant HSV: 40 mg/kg/dose q 8 hr for 3 wk.

6. Gancyclovir

Use: First choice drug for CMV infection, CMV retinitis, also active against HSV-1 and 2.

Dosage: Slow IV infusion:

- Congenital CMV infection: 15 mg/kg/day BD.
- CMV retinitis: > 3 mth: Induction therapy; 10 mg/kg/day twice a day for 14-21 day. Maintenance; 5 mg/kg/day twice a day for 5 days in a week.
- Other CMV infection: Initial dose of 10-15 mg/kg/day twice a day for 14-21 day followed by 5 mg/kg/day single daily dose.
- Oral (following induction by IV) 30 mg/kg/dose q 8 hr with food.

Brands: 250 and 500 mg Cap; Ganguard, Ganvir.

- Use with caution in patient with bone marrow suppression. May cause pancreatitis, hematuria, hypertension, electrolyte imbalance, neutropenia.

7. Idoxuridine

Use: Topical therapy for herpes simplex keratitis.

Dosage: Apply Oint 5 times/day and Solution 7-10 times/day.

Brands: 0.1% Oint; Toxil. 0.1% drop; Idurin, Ridinox.

8. Interferon Alfa

Use and Dosage: SC:

- Hemangiomas of infancy: 1-3 million units/m^2/day once daily.
- Chronic hepatitis-B: 3-10 million units/m^2/day, 3 times/week.

- Chronic hepatitis-C: 3 million units/m^2/day, 3 times/week.

Brands: 3 million units/vial (Alfa-2a); Inron-a, Roferon-A. 3 and 5 million units/vial (Alfa-2b), Shanferon, Realfa.

- Use with caution in patient with seizure disorder, myelosuppression, asthma, renal impairment. Should not be used in autoimmune hepatitis.

9. Lamivudine

Use: HIV infection, chronic hepatitis-B infection associated with evidence of viral replication and active liver inflammation.

Dosage: PO:

- Neonates: 2 mg/kg/day divided q 12 hr.
- Infants > 3 mth and children: 4 mg/kg/dose twice daily (Max: 150 mg/dose).
- Chronic hepatitis-B: 3 mg/kg/dose once daily (Max: 100 mg/day).

Brands: 100 and 150 mg Tab; Lamivir, Lamuvid, Shanvudin.

- Use with caution in patients with pancreatitis, hepatic failure. May cause HT, peripheral neuropathy, bone marrow suppression.

10. Oseltamivir

Use: Uncomplicated acute illness due to influenza A and B.

Dosage: Treatment should begin within 2 days of onset of symptoms.

Children: 1-12 yr: < 15 kg, 30 mg BD; > 15 kg to 23 kg, 45 mg BD; > 23 kg to 40 kg, 60 mg BD; > 40 kg, 75 mg BD; for 5 days.

- May cause anemia, hepatitis, myalgia, rash, hematuria.

11. Ribavirin

Use: RSV lower respiratory tract infection with compromising conditions (BPD, CLD, CHD); acute illness due to influenza A and B, adenovirus; oral preparation in combination with interferon Alfa-2b in chronic hepatitis-C in children > 3 yr of age.

Dosage: PO; Inhalation:

- Aerosol inhalation (dissolve 6 gm powder in 300 ml of sterile water). Continuous inhalation: 12-18 hr/day for 3-7 day. Intermittent inhalation: 2 gm over 2 hr, 3 times/day for 3-7 day.
- Oral: Chronic hepatitis-C in children >3 yr of age; 15 mg/kg/day divided q 12 hr (Max: 200 mg BD).

Brands: 100 and 200 mg Tab; Virazide. 50 mg/5 ml Syp; Ribavin, Virazide.

- Do not use in patients of hemoglobinopathies, autoimmune hepatitis. Use in well ventilated room, drug may precipitate in ventilator tubing, best results are seen in early initiation of treatment.

12. Rimantadine

Use: Prophylaxis (all ages) and treatment (>13 yr) of influenza-A viral infection.

Dosage:

- Prophylaxis: 1-9 yr up to 40 kg; 5 mg/kg/day divided q 12 hr (Max: 150 mg/day). More than 10 yr or above 40 kg; 100 mg in 2 divided dose.
- Treatment: 100 mg twice a day.

13. Trifluridine

Use: Treatment of primary keratoconjunctivitis or recurrent epithelial keratitis caused by HSV type 1 and 2.

Dosage: 1 drop 2-4 hr for 7-21 day.

Brands: 1% Ophthalmic drop; Viroptic.

14. Valacyclovir

Use: Treatment of herpes zoster, herpes labialis, initial and recurrent episode of genital herpes.

Dosage: 20-30 mg/kg/dose three times/day.

Brands: 500 and 1 gm Tab; Valcivir.

- May cause HT, rash, bronchospasm, hemolytic anemia, emotional disturbances, visual disturbances, etc.

26 CHAPTER

Cardiac Shocks and Failures

1. Amrinone

Use: Treatment of low cardiac output states.

Dosage: Initial dose of 0.75 mg/kg over 2-3 min followed by 5-10 mcg/kg/min as continuous infusion.

Brands: 5 mg/ml Inj; Amicor, Cardiotone.

- May cause hypotension, thrombocytopenia, dizziness, etc.

2. Digoxin

Use: Treatment of systolic heart failure and supraventricular tachyarrhythmias.

Dosage:

- Neonate: 10-30 mcg/kg loading dose followed by 5-10 mcg/kg/day as maintenance dose.
- 1 mth-2 yr: 30 mcg/kg loading dose followed by 10-15 mcg/kg/day as maintenance dose.
- 2-10 yr: 30 mcg/kg loading dose followed by 5-10 mcg/kg/day as maintenance dose.
- > 10 yr: 10 mcg/kg loading dose followed by 2-5 mcg/kg/day as maintenance dose.

Give half of the total digitalizing dose stat, then 1/4 after 8 hr and second 1/4 after 16 hr. Maintenance dose is given divided 12 hr in < 10 yr and once daily in > 10 yr of age.

Brands: 0.25 mg Tab; Cardioxin, Digoxin, Dixin, Lanoxin. 0.25 mg/ml Inj; Cardioxin, Digoxin, Dixin 1.5 mg/ml Syrup; Lanoxin.

Administration: Avoid rapid IV push, as it may cause systemic and coronary arteriolar vasoconstriction.

- May cause bradycardia, arrhythmias, blurred vision, GI disturbances, vertigo, hypokalemia, diplopia.
- Toxicity is enhanced by hypokalemia.

3. Milrinone

Use: Short-term treatment of acute decompensated heart failure.

Dosage: IV: Loading dose of 50 mcg/kg given slowly over 15 minutes followed by a continuous infusion of 0.5 mcg/kg/minute.

Brands: 1 mg/ml Inj; Milicor, Myolong.

- May cause arrhythmias, tremor, hypokalemia, rash.

4. Vasopressin

Use: Diabetes insipidus, GI hemorrhage or esophageal varices bleed, vasodilatory shock with hypotension not responding to catecholamines or fluid resuscitation.

Dosage:

- Vasodilatory shock with hypotension: IV: 0.0003-0.002 units/kg/minute titrate to effect.
- Diabetes insipidus: IM, SC: 2.5-10 units/dose can be given 2-4 times/day.
- GI hemorrhage: Continuous IV infusion of 0.002-0.01 units/kg/minute.

Brands: 20 units/ml Inj; Petressin, Cpressin-P.

- Use with caution in patients of asthma, seizure disorder, cardiac disease. May cause hypertension, bradycardia, arrhythmias, vertigo, bronchoconstriction, sweating, tremor, water intoxication.

27 CHAPTER

Chelating Agents

1. Deferiprone

Use: Transfusional hemosiderosis, acute iron poisoning, iron overload in hemolytic anemia.

Dosage: PO; 75 mg/kg/day divided q 8 hr.

Brands: 250 and 500 mg Tab; Kelfer.

- May cause neutropenia, urine discoloration, musculoskeletal pain, GI disturbances.

2. Desferrioxamine

Use: Acute iron poisoning, chronic iron overload in patient requiring multiple blood transfusion.

Dosage:

- Acute iron intoxication: IM; 90 mg/kg/dose q 8 hr. IV; 15 mg/kg/hr (Max: 6 g/day).
- Chronic iron overload: IV; 15 mg/kg/hr (Max: 12 g/day). SC; 20-40 mg/kg/day over 8-12 hr via infusion device. (Max: 2 g/day).
- In thalassemics: 15 mg/kg by IV infusion per unit of blood transfusion by separate line.

Brands: 500 mg/Vial; Desferal.

- May cause flushing, hypotension, urticaria, hearing loss, blurred vision, fever, urine discoloration. Periodic eye

and auditory examinations are recommended while on chronic therapy.

3. Dimercaprol

Use: Antidote to arsenic, gold and mercury poisoning, adjunct in lead poisoning.

Dosage: Deep IM: 2.5 to 4 mg/kg/dose q 4-6 hr for 2 days followed by 2.5 mg/kg dose q 12 hr for 10 days.

Brands: 100 mg/Vial; BAL.

4. D-Penicillamine

Use: Wilson's disease, copper and lead poisoning, rheumatoid arthritis.

Dosage: PO

- Wilson's disease: 20 mg/kg/day in divided doses (Max: 1 g/day).
- Lead poisoning: 20-30 mg/kg/day in divided doses (Max: 1.5 gm/day). Treatment duration 4-12 wk.
- Rheumatoid arthritis: 3 mg/kg/day for 3 mth then 6 mg/kg/day in 2 divided doses for 3 mth (Max: 10 mg/kg/day).

Brands: 250 mg Cap; Cilamin, Distamin, Penamine,

- Pyridoxine in a dose of 25-50 mg/day should be supplemented while on D-penicillamine therapy.

28 CHAPTER

Colony Stimulating Factors

1. Erythropoietin/rHuEPO/EPO

Use: Anemia of prematurity, neoplasia, end stage renal disease, chemotherapy induced, associated with AIDS and its therapy.

Dosage: IV, SC: Dosing schedules need to be individualized.

- Anemia of prematurity: 100-500 units/kg/dose, 3 times/wk.
- Chronic renal failure: 50-100 units/kg/dose, 3 times/wk.
- Cancer patients: 150 units/kg/dose, 3 times/wk.
- HIV patients: 100 units/kg/dose, 3 times/wk.

Brands: 2000 and 4000 IU/Vial; Epotin, Hemax.

- Iron, B_{12}, folic acid deficiency limits marrow response and EPO may be ineffective and these need to be supplemented. Avoid shaking the vial as this may denature the glycoprotein rending it ineffective. May cause HT, headache, seizure, edema, arthralgia.

2. Granulocyte Colony Stimulating Factor (G-CSF)

Use: Neonatal, congenital and idiopathic neutropenia; patients with malignancies receiving drugs associated with severe neutropenia and fever.

Dosage: IV, SC

- Neonates: 5 mcg/kg/day for 3-5 days once daily.
- Children: 5-10 mcg/kg/day once daily for up to 14 days.

Brands: 300 mcg/ml vial; Neupogen.

- Do not administer 24 hr prior to or within 24 hr following chemotherapy. After discontinuation of therapy ANC decreases by 50% within 2 days and returns to pretreatment level within 1 wk, WBC count return to normal range in 4-7 days.

3. Granulocyte Macrophage Colony Stimulating Factor (GM-CSF)

Use: Acceleration of myeloid recovery from chemotherapy or marrow insult or after bone marrow transplantation.

Dosage:

- Neonates: 10 mcg/kg/day once daily for 5 days.
- Children: 250 mcg/m^2/day once daily for 21 days.

Brands: 500 mcg/ml Inj; Leukine.

29 CHAPTER

Corticosteroids

Systemic steroids are contraindicated in active untreated infections and should be administered with food to decrease GI side effects. Taper gradually on long-term use. May cause edema, HT, pseudotumor cerebri, cushings syndrome, pituitary adrenal axis suppression, growth retardation, sodium retention, muscle weakness, osteoporosis, peptic ulcer. Topical use may cause thin fragile skin, hyper or hypopigmentation, skin atrophy. Patient may require diet rich in potassium, calcium, zinc, vitamin A, B, C, D; low in sodium content. Don't apply occlusive dressing after topical use and do not apply to face or inguinal areas.

1. Betamethasone

Use: Stimulate fetal lung maturation in preterm labor, congenital adrenal hyperplasia, brain edema, severe asthma; systemic and topical anti-inflammatory or immuno-suppressant.

Dosage: Depends upon disease severity and patient response.

- IM, PO; 0.01-0.2 mg/kg/day divided q 6-8 hr.
- Stimulate lung maturation: IM, Given to pregnant mother in 2 doses of 12 mg q 24 hr. or 4 doses of 6 mg q 12 hr.
- Topical: Apply thin film 1-2 times/day.

Brands: 0.5 and 1 mg Tab; Betnesol, Cortil. 0.5 mg/ml oral drops; 4 mg/ml Inj; Betnesol, Celestone Stemin. 0.05%

Cream; Betamil, Diprovate. 0.1% E/E drop; Betnesol, Milbeta.

Combinations: Betamethasone 0.1% + Chloramphenicol 5% + Lignocaine 2% each ml; Otina ear drop. Betamethasone 0.1% + Neomycin 0.5% each ml; Bentor ear drop, Betnesol-N ear drop.

2. Cortisone

Use: Adrenocortical insufficiency.

Dosage: PO; 0.5-0.7 mg/kg/day divided q 8 hr. IM: 0.25-0.35 mg/kg/day.

Brands: 25 mg Tab; 50 mg/ml Inj; Cortone.

3. Doflazacort

Use: Juvenile chronic arthritis, Asthma, Nephrotic Syndrome, Immune Suppression in transplantation.

Dasage: PO. Usual range is 0.25-1.5 mg/kg/day

Brands: 1, 6, 24 mg Tab; Defnalon, Enzocort.

- Use the lowest effective doses and titrate dose depanding upon response. Alternate day administration may be appropriate.

4. Dexamethasone

Use: Cerebral edema, septic shock, bacterial meningitis; systemically and locally for inflammation; allergic, autoimmune and neoplastic diseases.

Dosage:

- Physiologic replacement: PO; IM, IV; 0.03-0.15 mg/kg/day divided q 6-12 hr.
- Cerebral edema: PO; IM, IV; loading dose of 1-2 mg/kg, then 1-1.5 mg/kg/day divided q 4-6 hr.

- Bacterial meningitis: IV, 0.6 mg/kg/day divided q 6 hr for first 4 days of antibiotic.
- Anti-inflammatory: PO; IM, IV; 0.05-0.5 mg/kg/day in divided doses.
- Topical: Apply thin film 1-2 times/day.
- Eye drop: 1-2 drop q 4 hr then taper off gradually.

Brands: 0.5 mg Tab; 4 mg/ml Inj; Decdan, Dexacip, Dexona, Wymosone. 0.1% cream; Millicortenol. 0.01% eye drop; Decolite, Losone.

5. Fludrocortisone

Use: Partial replacement therapy for adrenal insufficiency.

Dosage: 0.05-0.1 mg/day single oral dose.

Brands: 100 mcg Tab; Floricot.

6. Hydrocortisone

Use: Adrenal insufficiency, congenital adrenal hyperplasia, toxic shock, status asthmaticus, anti-inflammatory or immunosuppressive in dermatosis.

Dosage: IV

- Adrenal insufficiency: 1-2 mg/kg bolus followed by 25-150 mg/day in divided doses.
- Congenital adrenal hyperplasia: Initial dose of 0.5-0.7 mg/day followed by maintenance dose of 0.3-0.4 mg/kg/day; given 1/4 in morning, 1/4 at noon and 1/2 at night.
- Shock: Initial dose of 35-50 mg/kg followed by 50-150 mg/kg/day divided q 6 hr for 2-3 days.
- Status asthmaticus: 4-8 mg/kg/day in divided doses.
- Anti-inflammatory: 1-5 mg/kg/day divided q 12 hr.
- Topical: apply 2-3 times/day.

Brands: 100 mg/vial; Efcorlin, Hycort, Lycortin, Wycort. 0.1% Cream; Elderoid, Lipo. 0.5% Cream; Tendrone. 2.5% Oint; Wycort.

Combinations: Efcorlin nasal drops contains, Hydrocortisone 0.02% + Naphazoline 0.025%.

7. Methylprednisolone

Use: Anti-inflammatory or immunosuppressant in variety of allergic, inflammatory, autoimmune and neoplastic disorders; acute spinal cord injury.

Dosage:

- Anti-inflammatory or immunosuppressant: PO; IM, IV: 0.5-2 mg/kg/day in divided doses. Pulse therapy; 15-30 mg/kg/dose given slowly once daily for 3 days.
- Status asthmaticus: IV; loading dose of 2 mg/kg/dose then 0.5-1 mg/kg/dose q 6 hr.
- Acute spinal cord injury: IV; 30 mg/kg over 15 min followed 45 min later by continuous infusion of 5 mg/kg/hr for one day.

Brands: 4, 8 and 16 mg Tab; Ivepred, Medrol, Predmet. 40, 125, 500 mg and 1 gm Inj; Mypred, Solu-medrol, Succimed.

8. Mometasone

Use: As anti-inflammatory and anti-pruritic in eczema, atopic and contact dermatitis; psoriasis.

Dosage: Cream and ointment : > 2 yr : Apply a thin film to affected area BD. Safety and efficacy for > 3 wk use is not established in pediatric patients.

Brands: 0.1% cream and Oint; Cutizone, Elocon, Momtas.

- Avoid contact/application to face eyes under arms, groin and open skin.

9. Prednisolone

Use: Treatment of rheumatic carditis, infantile spasms, collagen diseases, skin diseases, allergic problem, nephrotic syndrome, asthma, endocrine and neoplastic disorders.

Dosage: Depends upon disease severity and patient response. Use alternate day therapy for prolonged use.

PO; IV: 0.5-2 mg/kg/day divided q 6-8 hr.

Brands: 5, 10 and 20 mg Tab; Predone, Prid, Wysolone. 5 mg/5 ml Syrup; Kidpred, Predone. 40 mg/ml Inj; Unidrol, MPA.

10. Triamcinolone

Use: Various allergic and inflammatory conditions.

Dosage: 6-12 yr: IM; 0.03-0.2 mg/kg q 1-7 days. Intra-articular, intrabursal; 2.5-15 mg may be repeated as needed.

>12 yr of age: PO; 4-50 mg/day in divided doses.

Brands: 4 mg Tab; Kenacort, Ledercort, Tricort. 10 and 40 mg/ml Inj; Comcort, Kenacort, Tricort.

30 CHAPTER

Diuretics

1. Acetazolamide

Use: Diuretic, reduce CSF production in hydrocephalus, reduce increased intraocular pressure in glaucoma, as adjunct in refractory seizures.

Dosage:

- Edema: 5 mg/kg/day once daily.
- Refractory seizures and glaucoma: 8-30 mg/kg/day in divided doses.
- Hydrocephalus: 25-75 mg/kg/day divided q 8 hr.

Brands: 250 mg Tab; Acetamide, Diamox.

- Furosemide is used along with acetazolamide in hydrocephalus. May cause drowsiness, hypokalemia, hyperchloremic metabolic acidosis, hyperglycemia, dysuria, hepatic insufficiency.

2. Amiloride

Use: Edema due to CHF, hepatic cirrhosis and hyperaldosteronism, hypertension.

Dosage: 6-20 kg: 0.6 mg/kg/day once daily (Max: 10 mg/day). > 20 kg: 5-10 mg/day (Max: 20 mg/day).

Brands: Amiloride 2.5 mg + Hydrochlorothiazide 25 mg; Biduret Tablets.

Combinations: Amiloride + Hydrochlorthiazide: 5 + 50 mg, 2.5 + 25 mg Tab; Biduret and Biduret-L.

- May cause hypotension, palpitation, headache, electrolyte imbalances, dehydration, muscle cramps, visual disturbances.

3. Bumetanide

Use: Edema or fluid overload secondary to CHF, renal or hepatic disease.

Dosage: 0.015-0.1 mg/kg/dose q 6-24 hr (Max: 10 mg/day).

Brands: 1 mg Tab, Bumet.

- May cause electrolyte imbalances, hyperglycemia, hypotension, dizziness, GI disturbances. 1 mg of Bumetanide is as potent as 40 mg of Furosemide.

4. Chlorthalidone

Use: Fluid overload and mild hypertension.

Dosage: 1-2 mg/kg once daily.

Brands: 100 mg Tab; Hythalton.

5. Ethacrynic Acid

Use: Edema due to renal or hepatic disease, CHF and hypertension.

Dosage: PO; 1-3 mg/kg/day; IV: 0.5-1 mg/kg/dose q 8-24 hr.

Brands: 50 mg Tab; 50 mg/Vial; Edecrin.

- May cause hypotension, headache, fluid and electrolyte imbalances, ototoxicity, tinnitus.

6. Furosemide

Use: Edema associated with CHF and hepatic or renal disease; hypertension, cerebral edema, forced diuresis in poisoning.

Dosage: IV: 1-2 mg/kg/dose q 6-12 hr.

PO: 1-4 mg/kg/dose q 6-12 hr.

Continuous infusion: 0.05 mg/kg/hr and titrate to response.

Brands: 40 mg Tab; 10 mg/ml Inj; Frusenex, lasix.

- May cause hypotension, dizziness, fluid and electrolyte imbalance, ischemic hepatitis.

7. Hydrochlorothiazide

Use: Mild to moderate hypertension, edema states due to CHF, bronchopulmonary dysplasia, prevention of recurrent renal calcium stones.

Dosage: Neonates and infants < 6 mth: 2-4 mg/kg/day divided q 12 hr.

Infants > 6 mth and children: 2 mg/kg/day divided q 12 hr.

Brands: 12.5 and 25 mg Tab; Aquazide, Hydride.

8. Mannitol

Use: Reduction of increased ICP, promotion of diuresis in the prevention and treatment of oliguria or anuria due to ARF.

Dosage: IV: Test dose of 200 mg/kg (over 3-5 minutes to evaluate urine output of at least 1 ml/kg/hr for 1-3 hr) followed by initial dose of 0.5-1 g/kg, then maintenance dose of 0.25-0.5 g/kg q 4-6 hr.

Brands: 20% mannitol is available in 100 ml bottles by Albert David, Cadila and Core.

- Contraindicated in severe renal disease, dehydration, active intracranial bleed, severe pulmonary edema or congestion.

9. Spironolactone

Use: Hypertension, edema associated with CHF, chronic liver disease and nephrotic syndrome.

Dosage: 1-3 mg/kg/day once daily or in divided doses.

Brands: 25 and 100 mg Tab; Aldactone.

- May cause fluid and electrolyte imbalances, GI disturbance, numbness or paresthesia of limbs.

10. Triamterene

Use: Hypertension, edema due to CHF, hepatic or renal disease.

Dosage: 2-4 mg/kg/day divided q 12 hr (Max: 6 mg/kg/day).

Brands: Triamterene 50 mg + Benzthiazide 25 mg: Tab Ditide.

Triamterene 50 mg + Furosemide 40 mg: Tab. Frusemene.

31 CHAPTER

Drugs Used for Controlling Bleeding

1. Aminocaproic Acid

Use: Treatment of excessive bleeding resulting from systemic hyperfibrinolysis, traumatic ocular hyphema.

Dosage: PO; IV: Loading dose of 100-200 mg/kg, maintenance dose is 100 mg/kg q 6 hr (Max: 30 gm). In traumatic hyphema: 100 mg/kg q 4 hr.

Brands: 500 mg Tab; 250 mg/ml Inj; Hemostat.

- C/I in DIC. May cause hypotension, bradycardia, headache, seizure, hypokalemia, nasal congestion.

2. Antihemophilic Factor

Use: Factor VIII deficiency in hemophilia.

Dosage: IV: 20-50 U/kg/dose q 12 hr and titrate to required effect.

Brands: 25 IU Vial; Factor VIII.

3. Ethamsylate

Use: Prevention and treatment of periventricular hemorrhage in LBW neonates.

Dosage: Neonates: IM,IV: 12.5 mg/kg q 6 hr.

Brands: 250 and 500 mg Tab; 125 mg/ml Inj; Dicynene, Ethasyl, Sylate.

- Not helpful in thrombocytopenia.

4. Protamine

Use: Antidote to bleeding due to heparin overdose.

Dosage: 1 mg of protamine neutralizes 100 units of heparin (LMWH) (Max: 50 mg). Adjust the protamine dosage depending upon the duration of heparin administration.

Time since last heparin dose	*Dose of protamine to neutralize 100 units of heparin*
<30 min	1 mg
30-60 min	0.5-0.75 mg
60-120 min	0.3-0.5 mg

Brands: 1% Inj; Protamine sulphate.

- Excess dosage should be avoided as it can itself cause anticoagulation.

5. Tranexamic Acid

Use: Prevention of excessive bleeding after tonsillectomy, recurrent epistaxis, short-term use in hemophilia, prevention of GI hemorrhage and hemorrhage following ocular trauma.

Dosage: IV: 10 mg/kg/dose. PO; 25 mg/kg/dose 3-4 times/day.

Brands: 500 mg Tab; 100 mg/ml Inj; Clip, Pause, Tranfib, Traxamic.

32 CHAPTER Electrolyte Supplements and Fluid Replacements

1. Calcium Gluconate

Use: Hypocalcemia; hyperkalemia; cardiac arrest in the presence of hyperkalemia or hypocalcemia or calcium channel blocking agents toxicity.

Dosage: IV, 10% solution (100 mg/ml) is equivalent to 9 mg elemental calcium/ml or 0.46 mEq calcium/ml.

- Hypocalcemia: 200-800 mg/kg/day as continuous infusion or in 4 divided doses.
- Cardiac arrest and hyperkalemia: 60-100 mg/kg/dose. (Max: 3 g/dose).

Brands: 10% solution for Inj; Calcium gluconate.

- IV solution should be diluted to 50 mg/ml and be given slowly over 1 hr under monitoring. Use with caution in patient on digitalis therapy. May cause hypotension, bradycardia, arrhythmias, hypercalcemia, hypophosphatemia.

2. Calcium Phosphate

Use: Calcium deficiency states, rickets, chronic renal failure.

Dosage: PO

- Neonate: 20-80 mg/hg/day divided q 28 hr.
- Children: 45-65 mg/hg/day divided q 26-8 hr.

Brands: Ostocalcium Syp each 5 ml contains calcium 82 mg + Vit D_3 200 unit + Vit B_{12} 2.5 mcg. Ostocalcium Tab contains 125 mg of elemental calcium + Vit D_3 400 unit. Sovical-L Syp each 5 ml contain elemental calcium 200 mg + Vit D_3 200 U.

3. Magnesium Sulfate

Use: Treatment of hypomagnesemia, hypertension, seizures associated with acute nephritis in children, adjunctive therapy in bronchodilatation.

Dosage: IV; 50% solution (500 mg/ml) is equivalent to 49 mg elemental magnesium/ml or 4 mEq/ml.

- Hypomagnesemia: 25-50 mg/kg/dose q 8 hr in neonates and q 6 hr in children for 3-4 doses (Max: 2000 mg).
- Seizures and hypertension: 20-100mg/kg/dose q 4-6 hr as required.
- Bronchodilator: 25 mg/kg/dose as single dose (Max: 2000 mg).

Brands: 50% solution for Inj; Magnesium Sulfate.

- Dilute to 50-200 mg/ml for IV use and infuse over 2-4 hr. Use with caution in digitalized and renal impairment patient. May cause hypotension, hypermagnesemia, GI disturbances, CNS depression, muscle weakness, respiratory paralysis.

4. Potassium Chloride

Use: Hypokalemia; prevention and treatment.

Dosage: IV doses should be added to maintenance fluids and PO doses should be diluted to 8 times in water.

- Hypokalemia: PO, IV: 2-5 mEq/kg/day in divided doses.
- Prevention of hypokalemia during diuretic therapy: PO; 1-2 mEq/kg/day in 2 divided doses.

Brands: 600 mg Tab; K-gard. 10% Syrup; Keylyte, Potasol. 15% ampoule for Inj; Potassium chloride.

- Rapid administration may cause arrhythmias and cardiac arrest, hypotension. Injectable should only be given in patient with adequate urine flow. Tab provide 8 mEq; Inj; 2 mEq/ml and Syrup; 20 mEq/15ml.

5. Dextrose

Use: To correct hypoglycemia, provide calories and fluid replacement, as adjunctive in treatment of hyperkalemia.

Dosage: IV:

- Hypoglycemia: Neonates; 0.1-0.2 g/kg/dose (1-2 ml/kg/dose of 10% solution) followed by 4-6 mg/kg/min. Infants and children: 0.5-1 g/kg/dose (2-4 ml/kg/dose of 25% solution).
- Hyperkalemia: 0.5-1 g/kg of 25% or 50% solution combined with 1 unit of regular insulin for q 5 g dextrose, to be infused over 2 hr.

6. Sodium Bicarbonate

Use: Metabolic acidosis, life-threatening hyperkalemia, correction of acid base imbalance in cardiac arrest.

Dosage: 7.5% solution (75 mg/ml) is equivalent to 0.9 mEq/ml. If acid base status is not available then in older children empirical dose is 1-2 mEq/kg of 7.5% solution. Subsequent dose is calculated as follows; HCO_3 (mEq) = Base deficit × wt in kg × 0.6. Patient should be adequately ventilated before administering sodium bicarbonate in cardiac arrest.

Brands: 7.5% ampoule for Inj; Sodium bicarbonate.

- Contraindicated in hypocalcemia, hypernatremia, inadequate ventilation. May cause cerebral hemorrhage, metabolic alkalosis, hypernatremia, hypokalemia,

hypocalcemia, pulmonary edema. For IV use dilute in equal volume of sterile water.

7. Sodium Chloride

Use: Hyponatremia, restores moisture to nasal membrane.

Dosage: Normal saline (0.9%) is equivalent to 154 mEq/L and 3% NaCl is equivalent to 513 mEq/L.

- Acute symptomatic hyponatremia: Given as follows; Sodium mEq = wt in kg × 0.6 × (desired sodium-actual sodium).

In asymptomatic cases correct gradually as compared to symptomatic ones. Hypertonic NaCl should only be used for acute symptomatic hyponatremia. Dosage may vary depending upon fluid, electrolyte and acid base balance coupled with clinical conditions.

Brands: 0.9% and 3% Inj; NaCl. 0.9% Nasal spray; 0.65% gel for nasal application; Nasoclear.

- Hypertonic saline should be given via central line only. For acute correction use 125 mEq/L as the desired sodium level.

34 CHAPTER

Immunoglobulins

1. Human Anti-D (Rho-D) Immunoglobulin

Use:

a. Suppression of Rh isoimmunization (In mother): Used when the mother is Rho-D negative, father is either Rho-D positive or Rho-D unknown, baby is either Rho-D positive or Rho-D unknown. During delivery of Rho-D positive infant, abortion, chorionic villus sampling, amniocentesis, abdominal trauma, ruptured tubal pregnancy, transplacental hemorrhage.

b. Treatment of idiopathic thrombocytopenic purpura (ITP): Used in Rho-D positive nonsplenectomized children with acute or chronic ITP (Investigational).

Dosage: IM

- Pregnancy: 300 mcg at 28 wk and following delivery, preferably with in 72 hr of delivery.
- Postpartum: 300 mcg with in 72 hr.
- Threatened abortion: 300 mcg as soon as possible.
- Abortion, miscarriage, termination of ectopic pregnancy. <13 wk: 100 mcg and ≥ 13 wk: 300 mcg; within 72 hr.

Brands: 300 mcg/Vial; Gyne-D, Rhesuman, Rhogam.

- It has no role in already sensitized Rho-D negative women. Use with precautions in patient with bleeding

disorders or thrombocytopenia or patient with hemoglobin < 8 gm%.

2. Human Hepatitis B Immunoglobulin

Use: Prophylaxis of hepatitis B in babies born to HBsAg positive mothers, children acutely exposed to HBsAg positive blood or blood products.

Dosage: IM

- Neonates: First dose of 100-200 IU given soon after delivery, followed by second dose of 32-48 IU/kg after 2-3 mth. Hepatitis B vaccine should be given concurrently.
- Children: 32-48 IU/kg soon after exposure.

Brands: 100 IU/0.5 ml; Hepabig, Hepaglob.

3. Human Normal Immunoglobulin (IVIG)

Use: Immunodeficiency syndrome, ITP, Kawasaki disease, Guillain-Barre syndrome, acute bacterial or viral infections in immunosuppressed patient, demyelinating neuropathy, pediatric HIV infection.

Dosage: IM, IV

- Immunodeficiency: 300-400 mg/kg/dose q 2-4 wk. Maintain IgG level > 500 mg/dl.
- ITP: 400-1000 mg/kg/day for 2-5 day then q 3-6 wk based on platelet count and clinical response.
- Kawasaki disease: 2 gm/kg single dose.
- Guillian-Barre syndrome: 400 mg/kg/day for 4 day.
- Severe systemic viral or bacterial infection: Neonates: 500 mg/kg/day for 2 day. Children: 500-1000 mg/kg/wk.

Brands: 0.5, 1, 2.5 and 5 gm/Vial; Gamma IV, Intraglobin-CP, IV Globulin.

- Doses should be based on ideal body weight. Protection usually lasts for 1-3 months.

4. Human Rabies Immunoglobulin

Use: All proven and suspected rabid animal bite/exposure.

Dosage: 20 Units/kg (Max: 3000 IU).

Brands: 300 IU/Vial; Berirab-P, Imogam rabies, Rabglob. 750 IU/Vial; Berirab-P.

Administration: If patient reports within 24 hr of exposure, give maximum dose for infiltration and rest is given IM over deltoid. If reports after 24 hr to 7 day then give total dose IM. Do skin sensitivity test. Rabies vaccine should be used concurrently.

5. Human Tetanus Immunoglobulin (TIG)

Use: Prophylaxis in nonimmunized children and treatment of tetanus.

Dosage:
- Prophylaxis: 250 IU; IM or 4 units/kg.
- Treatment: 3000-6000 IU; IM and or 250 IU intrathecal.

Brands: 250 and 500 IU Inj: Immunotant, Tetglob.

6. Respiratory Syncytial Virus Immunoglobulin (RSV-IGIV)

Use: Prophylaxis in infants and children with severe immunodeficiency or immunosuppression; RSV infection in children < 2 yr of age with bronchopulmonary dysplasia or history of prematurity.

Dosage: IV; 750 mg/kg given monthly from the beginning to the end of RSV infection season.

Brands: 50 mg/ml Inj; Respigam.

- Immunization with live viral vaccine should be avoided for 9 mth.

7. Varicella Zoster Immunoglobulin (VZIG)

Use: Prophylaxis in immunocompromised children, newborn exposed to maternal varicella, pregnant women.

Dosage: IM; 125 units/kg soon after exposure or within 96 hr (Max: 625 units).

Brands: > 25 IU/ml Inj; Varitect-CP. 125 units/Vial; VZIG.

35 CHAPTER

Laxatives/ Stool Softeners

These agents are used for acute or chronic constipation or to evacuate bowel before surgery. Lactulose in addition is used for hepatic encephalopathy to lower ammonia levels.

1. Bisacodyl

Dosage: PO; 3-12 yr: 5 to 10 mg single dose/day >12 yr: 5-15 mg single dose/day.

Rectal: < 2 yr, 5 mg/day and > 2 yr, 5-10 mg/day single dose.

Brands: 5 mg Tab; Dulcolax, Julax, Relax. 5 and 10 mg rectal Suppository; Dulcolax, Conlax.

- Do not use in patient with abdominal pain, obstruction, appendicitis. Should not be used regularly for > a week.

2. Docusate

Dosage: In > 6 mth is recommended. < 6 yr: 20-40 mg/day and in > 6 yr 20-60 mg/day in 1-4 doses.

Brands: 100 mg Tab; 50 mg/5 ml Syrup ; 0.25%, 50 ml enema; Laxicon.

- Should not be used along with liquid paraffin.

3. Lactulose

Dosage: PO; Infants: 2.5-10 ml/day and in children 40-90 ml/day in 3-4 divided doses.

Brands: 10 g/15 ml Liquid; Duphalac, Evict, Lactulax.

- Target in hepatic encephalopathy is to produce 2-3 soft stools/day. Contraindicated in galactosemia or patient requiring low galactose diet. There occurs accumulation of hydrogen gas in intestine during therapy, could result in explosion if patient were to undergo electrocautery procedure.

4. Liquid Paraffin

Dosage: In children > 18 mth; initial 1 ml/kg can be increased up to 3 ml/kg once daily.

Brands: Liquid paraffin + Milk of magnesia; 3.75 ml + 11.25 ml per 15 ml; Cremaffin, Cremalax, Trulax.

- Chronic use leads to deficiency of fat soluble vitamins.

36 CHAPTER

Minerals

1. Fluoride

Use: Prevention of dental caries.

Dosage: Toothpaste once a day, rinse once or twice weekly, gel once each night.

Brands:

- Potassium nitrate 5%, fluoride toothpaste; Fludent-kF, Sensodent-k.
- Sodium Fluoride 0.2% + Potassium nitrate 3% Gel; Senquel-AD. Sodium Fluoride 0.1% + Zinc sulphate 0.025%; Hydent gel.
- Sodium Fluoride 0.2% Rinse; Fludent-M, Sensodent-F.

Do not swallow-rinse, paste or gel.

2. Iron

Use: Treatment of microcytic hypochromic anemia.

Dosage: RDA: 5-10 mg/day of elemental iron.

- Prophylaxis: PO; 1-2 mg/kg/day of elemental iron (Max: 15 mg/day).
- Deficiency: PO; 3-6 mg/kg/day of elemental iron in 2 divided doses. IM, IV=Hb deficit (g/dl) x weight in kg × 0.0476 + 1 ml/per 5 kg (Max: 14 ml of Iron Dextran).

Brands:

- 100 mg Tab; 50 mg/5 ml Syrup; 50 mg/ml drops, elemental iron; Feritin, Feritone, Ferium, Ferose. 80 mg/

5 ml pediatric Syrup; 25 mg/ml elemental iron drops; Tonoferon. 60 mg/5 ml Syrup; 20 mg/ml elemental iron drops; Ferrochelate. 25 mg and 50 mg Tab; 25 mg/5 ml elemental iron in Syrup; Rarecap.

- May cause GI irritation, nausea, diarrhea, dark stools, constipation, urine discoloration, teeth staining. Avoid in patient requiring frequent blood transfusion. When using for iron deficiency anemia, treat for additional 3-4 months after Hb return to normal in order to replenish total body iron stores.

3. Zinc

Use: Prevention and treatment of zinc deficiency, maintenance treatment of Wilson's disease (zinc acetate), acrodermatitis enteropathica, anemia; increase wound healing in deficiency states, diarrhea.

Dosage: RDA; < 1 yr: 5 mg/day. 1-10 yr: 10 mg/day.
>10 yr: 15 mg/day of elemental zinc.

- Deficiency: PO; 0.5-1 mg/kg/day in 2-3 divided doses.
- Acrodermatitis enteropathica; 6 mg/kg/day.

Brands: 20 mg/5 ml Syrup; Zinconia, Emzinc.
10 mg Tab; Zinconia, Emzinc.

Combinations: Elemental zinc 22.5 mg + Thiamine mononitrate 10 mg + Riboflabin 10 mg + Nicotinamide 50 mg + Pyridoxine 2 mg + Calcium pantothenate 12.5 mg + Tocopheryl 15 mg + Ascorbic acid 150 mg in each Cap; ZBC, Zevit.

- Zinc may decrease penicillamine, quinolone and tetracycline absorption. Iron and H_2 blockers decrease zine absorption.

4. Magnesium and Potassium

See under electrolyte supplement.

37 CHAPTER

Nutritional Supplements

1. Alfacalcidol

Use: Treatment of hypocalcemia (renal rickets, Vit D deficiency rickets).

Dosage: PO

- Premature neonates and infants: 0.05-0.1 mcg/kg/day
- Children: < 20 kg, 0.05 mcg/kg daily.

Brands: Alfacalcidol 0.25 mcg + Calcium 200 mg Tab; Alcalci, Alfa-arocal.

2. Calcium Phosphate

Use: Strong bone growth, inhibits the progression of enamel subsurface lesions and prevents calcium deficiency in children.

Dosage:

- Children: 5 ml Syrup after meals BO.

Brands: 200 ml Syrup: Ostocalcium B_{12} Syrup B/F; Each 5 ml contains. Vitamin D3 200 iu; Vitamin B_{12}, 2.5 mg; Calcium 82 mg. Ostocalcium B_{12} syrup L/L; Each 5 ml contains. Vitamin D_3 200 iu; Vitamin B_{12} Calcium 82 mg. Ostocalcium Tablet; Vitamin D_3 400 iu, 2.5 mg; Tribasic calcium phosphate IP 0.323g (equivalent to 125 mg of calcium).

3. Carnitine

Use: Treatment of carnitine deficiency, to improve IV fat emulsions utilization by premature neonates, cardiomyopathy, myopathy, long-term hemodialysis.

Dosage:

- Premature neonates: IV: 10-20 mg/kg/day in parenteral nutrition solution.
- Children: PO, IV: 50-100 mg/kg/day in divided doses.

Brands: 330 and 500 mg Tab: 500 mg/5 ml Syrup; 200 mg/ml Inj; Carnitor.

4. Fat Emulsion

Use: Source of calories and essential fatty acids for patients requiring parenteral nutrition of prolonged duration.

Dosage: IV

- Premature infants: Starting dose of 0.25-0.5 g/kg/day, increase by 0.25 g/kg/day to a maximum of 3 g/kg/day.
- Infant and children: Starting dose of 0.5-1 g/kg/day, increase by 0.5 g/kg/day to a maximum of 4 g/kg/day.

Administration: Maximum rate of infusion in neonates is 0.15 g/kg/hr or 0.75 ml/kg/hr of 20% solution. In infants and children, it is 0.25 g/kg/hr or 1.25 ml/kg/hr of 20% solution. Heparin may be added in a dose of 1-2 units/ml.

- Fat calories should not exceed 60% of the total daily calories. 10%=1.1 k cal/ml and 20% = 2 k cal/ml.

Brands: Intralipid IV: Contain soyabean oil 100 mg/ml (10%) or 200 mg/ml (20%) + fractioned egg phospholipid 12 g + Glycerol 22.5 g/100 ml. 10% in 100 and 500 ml bottle and 20% in 100 and 250 ml bottle.

5. Medium Chain Triglycerides (MCT Oil)

Use: Nutritional supplement in infants for those who cannot digest long chain fats, induce ketosis as a prevention for seizures.

Dosage:

- Infants: Start at 0.5 ml with every other feeding, then increase with every feeding. Children for seizures: About 40 ml with each meal or 50-70% of total calories.

Brands: Simyl MCT oil by FDC.

- May cause sedation, narcosis, ketosis, diarrhea.

38 CHAPTER Pituitary Hormones

1. Adrenocorticotropin (ACTH)

Use: Infantile spasms, as immunosuppressant, severe muscle weakness in myasthenia gravis.

Dosage:

- Infantile spasms: IM, SC: Initial dose of 20 units/day for 2 wk if required effect occur then taper and discontinue over 1 wk, if not responding increase to 30 units/day for 2 wk and then taper and discontinue over 1 wk (Range: 5-160 units/kg/day).
- Immunosuppression: IV, IM, SC; 0.8 unit/kg/day divided q 12-24 hr.

Brands: 60 units/ml Inj; Actonprolongatum. 40 and 80 units/ml Inj; Corticotrophin.

- May cause HT, acne, Cushing's syndrome, sodium and water retention, hypokalemia. Do not stop abruptly.

2. Desmopressin

Use: Primary nocturnal enuresis, diabetes insipidus.

Dosage:

- Diabetes insipidus: PO; 0.05 mg starting dose and titrate to effect. Intranasal; 5-30 mcg/day in divided doses. SC, IV; 2-5 mcg/day in divided doses.

- Enuresis: > 6 yr of age; Intranasal; 20 mcg/day as starting dose can be increased up to 40 mcg. PO; 0.05-0.1 mg at bedtime.

Brands: 0.1 mg Tab; 4 mcg/ml Inj; Minirin. 1 mcg/ml, Nasal spray; D-Void, Minirin.

- Avoid intranasal use in patient of nasal edema, discharge, atopic rhinitis, obstruction. May cause facial flushing, tachycardia, headache, dizziness, hyponatremia.

3. Somatropin (Growth Hormone)

Use: Growth failure due to inadequate growth hormone secretion, chronic renal failure, short stature in Turner syndrome.

Dosage: IM, SC: 0.06-0.16 IU/kg 3 times/wk.

Brands: 16 IU/Vial; Genotropin. 4, 16, 18, and 36 IU/Vial; Humatrope.

- May cause headache, intracranial hypertension with papilloedema, local lipoatrophy, reversible hypothyroidism.

4. Vasopressin

See under cardiac shock and failure.

39 CHAPTER

Plasma Volume Expanders

1. Albumin

Use: Hypovolemia, plasma volume expansion and maintenance of cardiac output, hypoproteinemia, neonatal jaundice.

Dosage:

- Hypoproteinemia: 0.5 g/kg/dose, may be repeated q 1-2 days.
- Hypovolemia: 0.5 g/kg/dose, may be repeated as needed (Max: 1 g/kg/day in neonates and 6 g/kg/day in children).

Brands:

- 20% Human albumin in 50 and 100 ml bottles; Albudac, Albumeon, Albupan.
- 5% Human albumin in 100 ml bottle; Sii human albumin.
- 25% Human albumin in 50 and 100 ml bottles; Albudac.

Administration: Rapid infusion may result in vascular overload. Rate of infusion should be 2-4 ml/min of 5% and 1 ml/min of 25% albumin. Albumin 5% should be used for hypovolemic patients and 25% should be used for patient with fluid or sodium restriction. Use lowest possible concentration in neonates.

2. Dextran

Use: Fluid replacement and blood volume expander in shock or impending shock; Dextran 40 may be used for prophylaxis of venous thrombosis and pulmonary embolism.

Dosage: Dose and infusion rate must be individualized and be calculated depending upon the patient's fluid status. Total dose on day 1 is 20 ml/kg, second day onward it is 10 ml/kg/day and do not use for > 5 days.

Brands: Dextran 40, 10% in NS or in 5% dextrose; Rallidex, Microspan-40. Dextran 70, 6% in NS or in 5% dextrose; Lamodex-70.

- Contraindicated in CHF, renal failure, hypervolemia, thrombocytopenia, bleeding disorder; keep ready epinephrine and antihistamines to treat any anaphylactic reactions.

40 CHAPTER

Scabicidal Agents

These agents should be applied from head to toe in children for 2-3 days followed by thorough bath after 8-12 hr of application. Avoid contact with eyes, face, mucus membranes, urethral meatus and do not apply to inflamed or raw skin. These agents are also helpful in treatment of pediculosis. Course can be repeated after 7-10 days if required. Give antibiotic for secondary infection and also antipruritic agents if required.

1. Benzyl Benzoate

Brands: 25% lotion; Benzyl benzoate.

2. Crotamiton

Also useful in pruritic skin conditions.

Brands: 10% Cream and lotion; Crotorax.

3. Gamma Benzene Hexachloride (GBHC)

Brands: 1% lotion; Scaboma, Welscab.

4. Permethrin

Brands: 5% Cream; Clerkin, Permarid, Permite 5% lotion; Permisol, Scabitol-p.

41 CHAPTER

Skeletal Muscle Relaxants

1. Baclofen

Use: Treatment of cerebral spasticity, spinal cord lesions spasticity, trigeminal neuralgia.

Dosage: PO; IM: > 2 yr of age; 10-15 mg/day divided q 8 hr and titrate dose q 3 days to maximum of 40 mg/day.

Brands: 10 and 25 mg Tab; Liofen, Riclofen, Spinofen. 50 mg/ml Inj; Liofen.

- When used along with benzodiazepines, opiates, tricyclic antidepressants, increased CNS depression is seen.

2. Chlorzoxazone

Use: Symptomatic treatment of muscle spasm and pain.

Dosage: PO; 20 mg/kg/day in 3-4 divided doses.

Brands: Chlorzoxazone + PCM: 250 + 300 mg Tab; Duodil, Myospaz, Parafon.

- May color urine orange or red, fever, rash, anorexia, hepatitis, drowsiness.

3. Dantrolene

Use: Treatment of spasticity associated with UMN lesions (Spinal cord injury, stroke, CP)

Dosage: PO

Initial: 0.5 mg/kg/dose twice daily, can be increased weekly upto a maximum of 3 mg/kg/dose.

Brands: 25, 50, 100 mg Cap; Dantrium.

4. Methocarbamol

Use: Supportive therapy in tetanus, muscle spasm associated with acute painful musculoskeletal condition.

Dosage: IV: Tetanus; 15 mg/kg/dose q 6 hr for 3 days only.

Brands: 100 mg/ml Inj; Robinax. Methacarbamol + PCM: 400 + 325 mg Tab; Flexinol, Neuromol-MR.

- May cause hypotension, bradycardia, drowsiness, headache, nausea.

42 CHAPTER Sympathomimetics

1. Adrenaline/Epinephrine

Use: Cardiac arrest, bronchospasm, anaphylactic reaction.

Dosage:

- Neonates: IV, Intratracheal: 0.01-0.03 mg/kg q 3-5 min as needed (0.1-0.3 ml/kg of 1: 10,000 solution).
- Infants and Children:

SC: 0.01 mg/kg (0.01 ml/kg of 1:1000 solution).

IV: 0.01 mg/kg (0.1 ml/kg of 1:10,000 solution). Max: 1 mg, may be repeated q 3-5 min as needed.

Intratracheal: 0.1 mg/kg (0.1 ml/kg of 1:1000 solution) Max: 0.2 ml/kg.

Continuous infusion: 0.1-1 mcg/kg/min.

Inhalation: 0.1 ml/kg of 1:10,000 solution by nebulizer diluted in 3 ml of NS.

Brands: 1 mg/ml of 1:1000 dilution Inj; Adrenaline, Vasocon.

- May cause pallor, tachycardia, HT, headache, tremor, nausea, etc.
- Incompatible with sodium bicarbonate.

2. Dobutamine

Use: Treatment of hypotension persisting after adequate fluid volume replacement.

Dosage: 5-20 mcg/kg/minute as continuous infusion and titrate to response (Max: 40 mcg/kg/minute).

Brands: 250 mg/Vial; Cardiforce, Cardiject, Dobustat.

- Diluted in NS or dextrose, maximum recommended concentration is 5000 mcg/ml (5 mg/ml). May cause ectopics, tachycardia, tachyarrhythmias, leg cramps, paresthesias. Do not administor via umbilical arterial catheter in neonates.

3. Dopamine

Use: Treatment of shock and hypotension unresponsive to adequate fluid volume replacement.

Dosage: 1-20 mcg/kg/minute continuous infusion, titrate to desired response (Max: 20 mcg in neonates and 50 mcg/kg/min in infants and children).

Brands: 40 mg/ml Inj; Dopacard, Dopa-plus, Dopar.

- If dose more than 30 mcg/kg/min is required then direct acting agents like epinephrine and norepinephrine may be more beneficial. Maximum concentration allowed for IV use 3200 mcg/ml. May cause ectopics, tachycardia, vasoconstriction, ventricular arrhythmias, decreased urine output in high doses. Do not administor via umbilical arterial catheter in neonates.

4. Ephedrine

Use: Nasal congestion.

Dosage: 2 drops in each nostril 2-3 times/day.

Brands: Ephedrine 0.75% and 0.5% + Menthol 0.5% + Camphor 0.5% + Eucalyptol 0.5% + Castor oil 0.5%, Drop Endrine and Endrine mild.

5. Norepinephrine

Use: As Dopamine

Dosage: 0.05-0.1 mcg/kg/minute, titrate to required effect (Max: 2 mcg/kg/minute).

Brands: 1 mg/ml base Inj; Adrenor, Levonor.

- May cause arrhythmias, bradycardia, tachycardia, organ ischemia due to vasoconstriction etc.

6. Oxymetazoline

Use: Symptomatic relief of nasal congestion.

Dosage: 2-12 yr: 0.025%, 2-3 drop 3 times/day.

> 12 yr: 0.05%, 2-3 drop 3 times/day.

Brands: 0.025 and 0.05% nasal drop; Nasivian and Sinarest.

7. Phenylephrine

Use: Symptomatic relief of nasal and nasopharyngeal mucosal congestion, as a mydriatic in ophthalmic procedure.

Dosage: Nasal congestion: 1-2 drop/nostril q 6 hr , should not be used for > 5 days.

Ophthalmic procedure: 1drop 15-30 min before procedure.

Brands: 0.25% Nasal drop; Andre and Fenox. 5% eyedrop; Efrosyn, Fenilefrina.

- Causes rebound congestion on prolonged nasal use.

8. Pseudoephedrine

See under antihistaminic.

9. Xylometazoline

Use: Symptomatic relief of nasal congestion.

Dosage: 2-12 yr: 2-3 drop of 0.05% solution q 8 hr.

> 12 yr: 2-3 drop of 0.1% solution q 8 hr.

Brands: 0.05 and 0.1% pediatric and adult nose drop; Decon, Otrivin.

43 CHAPTER

Thyroid and Antithyroid Agents

1. Carbimazole

Use: Hyperthyroidism, in thyrotoxicosis prior to thyroidectomy.

Dosage: PO; 1-2 mg/kg/day divided q 8 hr.

Brands: 5, 10 and 20 mg Tab; Neomercazole, Thyrocab.

- May cause hypothyroidism, GI disturbances, rash, agranulocytosis.

2. Liothyronine

Use: Replacement therapy in congenital or acquired hypothyroidism.

Dosage: PO; Initial dose of 5 mcg/day, may be increased by 5 mcg q 3 days to a maximum of 20 mcg/day for <1 yr; 50 mcg/day for 1-3 yr and 75 mcg/day for more than 3 years.

Brands: 20 mcg Tab; Tetroxin. 20 mcg Inj; Triiodothyronine.

- May cause palpitations, arrhythmias, HT, weight loss, tremor, diaphoresis, insomnia.

3. Propylthiouracil

Use: Hyperthyroidism, thyrotoxic crisis.

Dosage: PO; 5-7 mg/kg/day divided q 8 hr and titrate to the required effect. Maintenance dose usually begins after

2 mth and it is 1/3 to 2/3 of the initial dose, given divided q 8-12 hr.

Brands: 50 mg Tab; PTU.

4. Thyroxine

Use: As liothyronine.

Dosage: PO; 0-6 mth: 10-15 mcg/kg; 6-12 mths: 6-8 mcg/kg; 1-5 yr: 5-6 mcg/kg; 6-12 yr: 4-5 mcg/kg; >12 yr: 2-3 mcg/kg.

Brands: 25 and 50 mcg Tab; Thyrochek, Thyrox, Thyronorm. 100 mcg Tab; Eltroxin, Roxin.

44 CHAPTER

Vaccines

1. BCG

Live attenuated vaccine of bovine strain, contains 0.1-0.4 million mycobacteria. Given 0.1 ml intradermal, use within 4 hr of reconstitution, given from birth to 60 days.

Brands: 10 dose/vial by Aventis and Serum.

2. DPT

Available as either whole cell or highly purified acellular component vaccine. Primary doses at 6, 10, 14 wk and booster at 18 mth and 5 yr. Given 0.5 ml deep IM. Contain D. toxoid > 20 to < 30 Lf, T. toxoid > 5 to < 40 Lf and B. Pertussis 20,000 million killed bacteria per dose. Acellular vaccine has lower incidence of side effects.

Brands: Triple antigen (whole cell); Single and multidose Vial; Infanrix, Tripacel (acellular); Single dose 0.5 ml Inj.

3. DT

Indicated in children where pertussis component is contraindicated. Contain D. toxoid 20-30 Lf and T. toxoid 5-25 Lf, given 0.5 ml IM.

Brands: Dual antigen; Single and multidose vial.

4. Hepatitis-B

Is a purified surface antigen vaccine, either genetically engineered or plasma derived. Contain 10 mcg/0.5 ml, given IM. Primary doses at birth, 6, 14 wk or 6, 10, 14 wk or 0, 1, 6 months.

Brands: Bevac, Engerix-B, Genevac-B, Single and multidose vial.

5. Hepatitis-A

Available as inactivated and live attenuated forms. Given after one year of age in two primary doses at 6 mth interval.

Brands: Havrix; 720 ELISA units/0.5 ml and 1440 ELISA units/1 ml of HM-175 inactivated antigen. Avaxim; 80 U/0.5 ml and 160 U/1 ml of inactivated GBM strain. Biovac-A; 6.5 $LgCCID_{50}$/1 ml of H_2 attenuated strain. Havrix and Avaxim given IM and Biovac-A SC.

6. *Haemophilus Influenzae* Type-B Conjugate

Conjugate of purified capsular polysaccharide to either diphtheria or tetanus toxiod (PRP-D, PRP-T). Given IM 0.5 ml in 3 doses when started below 6 mth, 2 doses between 6 to 12 mth and 1 dose between 12 to 15 mth. Booster between 15-18 mth. Between 18 mth to 5 yr single primary dose.

Brands: Hiberix, Act-hib, Novohib; 10 mcg of PRP-T/0.5 ml. Hibtitre, Vaxemhib; 10 mcg of PRP-D/0.5 ml.

7. Influenza Virus Vaccine

Is an inactivated vaccine. Given IM, children between 6 mth-3 yr 0.25 ml single dose if previously vaccinated otherwise

2 doses at 4 wk interval, if > 3 yr dose is 0.5 ml. Revaccinate every year with strain adjusted vaccine.

Brands: Vaxigrip; 7.5 mcg of A+7.5 mcg of B Virus antigen/0.25 ml.

8. IPV

Is an inactivated Salk strain vaccine. Given IM, 3 primary doses at 6, 10, 14 wk or 8, 12, 16 wk; booster at 15 mth (at an interval of 6 mth from 3rd dose).

Brands: Imovax, Polprotec; Contain type 1 > 40 DU + type 2 > 08 DU + type 3 > 32 DU/0.5 ml.

9. Measles

Live attenuated Edmonston-Zagreb strain vaccine. Given SC at 7-9 mth of age as single dose.

Brands: M-VAC; 1000 $CCID_{50}$/0.5 ml.

10. MMR

Live attenuated vaccine. Given SC at 15-18 mth of age.

Brands: Tresivac; Measles E-Z strain > 1000 $CCID_{50}$ + Mumps L-Z strain > 5000 $CCID_{50}$ + Rubella RA 27/3 strain > 1000 $CCID_{50}$ per 0.5 ml. Inj Priorix; Measles Schwarz strain > 1000 $CCID_{50}$ + Mumps RIT 4385 > 1000 $CCID_{50}$ + Rubella RA 27/3 > 1000 $CCID_{50}$/0.5 ml, Inj.

11. Meningococcal

An inactivated capsular polysaccharide vaccine. Given IM in > 2 yr of age during an epidemic, single dose followed by booster q 2 yr.

Brands: Mancevax Inj; each 0.5 ml dose contain 50 mcg of A, C, W and Y serotype. Meningococcal Inj; each 0.5 ml dose contain 50 mcg of A and C serotype.

12. OPV

Live attenuated Sabin strain vaccine. Given PO 2 drops at birth, 6, 10 and 14 wk. Booster at 18 mth and 5 yr.

Brands: OPV 20 dose vial by Haffkine and GSK, contain type 1> 10^6, Type 2 > 10^5 Type 3 > $10^{5.5}$ $CCID_{50}$ per dose.

13. Pneumococcal Vaccine

Is a polysaccharide vaccine available in 7 and 23 valent forms. Recommended in > 2 yr, 23 valent is given 0.5 ml IM or SC single dose followed by booster after 3-5 years. For 7 valent primary doses are given at 6, 10, 14 wk followed by booster at 12-15 mth.

Brands: Pneumo-23, Pneu-immune 23, 0.5 ml dose contain 25 mcg of each serotype. Prevenar is a 7 valent and contain 2 mcg of each serotype.

14. Rabies

Is an inactivated tissue culture vaccine. Available as human diploid cell vaccine (HDCV), purified chick embryo vaccine (PCEV) and purified verocell rabies vaccine (PVRV). Given IM, pre-exposure prophylaxis consist of 3 doses at 0, 7 and 28 days and postexposure schedule is 0, 3, 7, 14, 28 and 90 days.

Brands: Rabipur Inj; (PCEV) 0.5 ml/dose; Rabivax Inj; (HDCV) 0.5 ml/dose. Verorab Inj; (PVRV) 0.5 ml/dose.

15. Rotavirus Vaccine

Live attenuated human rotavirus RIX 4414 strain vaccine containing not less than 10^6 $CCID_{50}$. Given PO, 2 doses at 4 wk interval starting from 6 wk of age onwards.

Brands: Rotarix; Single dose 1 ml.

16. Td

Is a low dose diphtheria vaccine combined with tetanus toxoid, recommended in > 7 yr of age and should replace TT at 10 and 16 yr. Given 0.5 ml IM.

Brands: Td vac Inj; Contain D. toxiod < 5 Lf and T. Toxoid > 5 Lf/dose.

17. Typhoid

Is a purified Vi capsular polysaccharide vaccine. Given IM after 2 years of age and booster every 3 years.

Brands: Biovac, Typbar, Typhim Vi Inj; Contain 25 mcg of Salmonella type 2 (Vi antigen).

18. TT

Is an alum precipitated toxoid vaccine, contain 5-25 Lf of toxoid. Given 0.5 ml IM.

Brand: Inj. BETT single dose ampoule.

19. Varicella/Chicken Pox Vaccine

Live attenuated Oka strain vaccine. Given SC, single dose in 1-13 yr and 2 doses in > 13 yr with a gap of 4 wk.

Brands: Varivax Inj; Contain ≥ 2000 PFU/dose. Okavax Inj; Contain ≥ 1000 PFU.

45 CHAPTER

Vasodilators

1. Nitroglycerine

Use: Shock, portal hypertension, CHF, hypertensive emergencies.

Dosage: In children by continuous infusion.

Initial 0.25-0.5 mcg/kg/minute; titrate by 0.5-1 mcg/kg/min q 3-5 min to maximum of 5 mcg/kg/min.

Brands: 5 mg/ml Inj; NIG, Nitrocin, Nitroject.

- For IV use dilute in D-5% or NS to 50-100 mcg/ml. Vasodilates veins more than arteries. May cause flushing, hypotension, reflex tachycardia, dizziness, headache.

2. Tolazoline

Use: Treatment of persistent pulmonary hypertension.

Dosage: Neonates; IV; 1-2 mg/kg loading dose followed by 1-2 mg/kg/hr continuous infusion.

- May cause hypotension, tachycardia, increased respiratory and gastrointestinal secretions, GI bleed, flushing, pulmonary hemorrhage.

3. Diazoxide, Hydralazine, Minoxidil, Nitroprusside, Phenoxybenzamine, Phentolamine, Prazocin

For details of these drugs see under antihypertensives.

46 CHAPTER

Vitamins

VITAMINS

1. Biotin

Use: Nutritional biotin deficiency, primary biotinidase deficiency.

Dosage: RDA: 10-200 mcg/day.

Biotinidase deficiency: 5-10 mg once daily.

Biotin deficiency: 5-20 mg once daily.

Brands: 5 mg Tab; H-Vit, Oltin.

2. Cyanocobalamin/Vitamin B_{12}

Use: Megaloblastic anemia, nutritional supplement, increased B_{12} requirement due to hemorrhage, liver or kidney disease.

Dosage: RDA: 0.3-2 mcg/day.

- Megaloblastic anemia: IM; 30-50 mcg/day to total dose of 1000-5000 mcg and then 100 mcg per month.
- Deficiency: 100 mcg/day for 15 days then once or twice weekly for several month.

Brands: 1000 mcg B_{12} in 2 ml ampoule along with vitamin B_1 and B_6; Bevidex, Macrabarin.

- Severe hypokalemia may occur after conversion of megaloblastic anemia to normal erythropoiesis so serum potassium level should be monitored.

3. Folic Acid

Use: Megaloblastic and macrocytic anemia, tropical sprue.

Dosage: RDA: Neonates to 6 mth; 30 mcg/day. 6 mth-3 yr; 50 mcg/day. 4-6 yr; 75 mcg/day. 7-10 yr; 100 mcg/day. > 11 yr; 150 mcg/day.

Deficiency: 5 mg/day

Brands: 5 mg Tab; Fol-5, Folet, Folium, Folvite.

- Large doses may mask the hematologic effect of B_{12} deficiency while allowing the neurologic complication due to deficiency to progress.

4. Niacin/Vitamin B_3

Use: Treatment of pellagra, dietary supplement, hyperlipidemia.

Dosage: RDA: 5-15 mg/day.

Pellagra: 50-100 mg/dose 3 times/day.

Hyperlipidemia: 10 mg/kg/day is maximum dose.

5. Pyridoxine/Vitamin B_6

Use: Prevention and treatment of B_6 deficiency, pyridoxine dependent seizures, treatment of drug induced deficiency, e.g. isoniazid, cycloserine, hydralazine.

Dosage: RDA: 0.5-1.5 mg/day.

- Pyridoxine dependent seizures: PO, IV, IM; 50-100 mg initial dose, maintenance dose: 50-100 mg/day, PO.
- Dietary deficiency: 5-15 mg/day for 3-4 wk then 2.5-5 mg/day.
- Drug induced neuritis: PO; For treatment 10-50 mg/day and for prophylaxis 1-2 mg/kg/day.

Brands: 40 mg Tab; Benadon. 100 mg Tab; B-Long, Pyricontin. 100 mg pyridoxine + B_1 + B_6 Inj; Bevidox, Neurokem. Pyridoxine 3 mg + Nicotinamide 100 mg + Cyanocobalamin 15 mcg + Folic acid 1500 mcg + Chromium picolinate 250 mcg + Selenium 100 mcg per cap; Cobadex. Cobadex-Z in addition contain elemental zinc 22.5 mg per cap.

- Sensory neuropathy may occur after chronic administration of large doses and large IV doses may precipitate seizures.

6. Riboflavin/Vitamin B_2

Use: Prevention and treatment of riboflavin deficiency.

Dosage: RDA: 0.5-1 mg/day.

Deficiency: 2.5-10 mg/day in divided doses.

Brands: 20 mg Tab; Lipabol.

7. Thiamine/Vitamin B_1

Use: Beriberi, Wernicke's encephalopathy, peripheral neuritis.

Dosage: RDA: 0.2-1 mg/day or 0.5 mg/1000 kcal diet.

- Beriberi: PO, IM, IV; 10-30 mg/day for 2 wk then 5-10 mg PO/day for 1 mth.
- Encephalopathy: IM, IV; 100 mg/day until consuming a regular balanced diet.

Brands: 75 mg Tab; Benalgis. 100 mg Tab; Beneuron forte, Berin. Thiamine 10 mg + Vit B_2 10 mg + Vit B_{12} 15 mcg + Folic acid 1500 mcg + Calcium pantothenate 50 mg + Vit C 150 mg, Cap; Glace-X. 100 mg/ml Inj; Berin.

- Rapid IV administration may lead to cardiovascular collapse and death.

8. Vitamin A

Use: Treatment and prevention of vitamin A deficiency, supplementation in children with measles.

Dosage: RDA: 1000-3000 IU/day as per age.

- Deficiency: PO; > 1 yr: 200, 000 IU for 2 days and then 1-4 wk later. 6-12 mth, 1/2 of above dose and in < 6 mth 1/4 of the above dose and schedule.
- Prophylaxis in patient at risk (malnutrition, severe infection, recurrent diarrhea, pneumonia). In < 1 yr; 100,000 units and in > 1 yr; 200,000 units given PO q 4-6 mth.

Brands: 50,000 units Tab; and Cap; 50,000 units/ml Inj; Vitamin A.

- Hypervitaminosis-A may occur with massive doses or with large doses given over long period and manifest as nausea, vomiting, drowsiness, papilledema, symptoms of raised ICP.

9. Vitamin C/Ascorbic Acid

Use: Scurvy, urinary acidification.

Dosage: RDA: 30-50 mg/day.

- Scurvy: 100-300 mg/day.
- Urinary acidification: 500 mg q 6 hr.
- To increase iron excretion during desferrioxamine therapy: 100-200 mg/day.

Brands: 100 and 500 mg Tab; Celin, Cell-C. 100 mg/ml Drops; Cecon, Celin. 100 mg/ml Inj; Redoxon, Tildoxon.

10. Vitamin D

Use: Rickets

Dosage: PO and IM; 1500 mcg or 600,000 IU. If no signs of healing on skiagram after 3-9 wk of therapy then repeat the dose.

Brands: 60,000 IU/Sachet; Calcirol granules (Alfacalcidol).

3 lakh (7.5 mg) and 6 lakh (15 mg) IU/ml Inj; Arachitol (Vitamin D_3).

- High dose of vitamin D_3 given over long period may cause anorexia, vomiting, hypotonia, polydipsia, polyuria, hypercalcemia, hypercalciuria.

11. Vitamin E/α Tocopherol

Use: Vitamin E deficiency treatment and prevention, nocturnal muscle cramps, prevention of retinopathy of prematurity.

Dosage: (1 mg = 1.5 units)

- Prevention: Neonates; 5 units/day. Children; 10-20 units/day. Patients of cystic fibrosis, beta-thalassemia, sickle cell anemia require higher daily maintenance doses.
- Deficiency: Neonates; 25-50 units/day. Children; 1 unit/kg/day.

Brands: 200 and 400 mg Cap; Evion, Evit, Tocofer, 50 mg/ml drops; Evion.

12. Vitamin K

Use: Nutritional supplement, hemorrhagic disease of the newborn, prevention and treatment of hypoprothrombinemia caused by vitamin K deficiency or anticoagulant induced hypoprothrombinemia.

Dosage:

- HDN: 0.5 mg for preterm and 1 mg for term neonate within 1 hr of birth.
- Children: IM, IV, SC; 1-2 mg/dose: PO; 2.5-5 mg/dose.

Brands: 10 mg/ml Inj; Kapilin (Vit K analog menaphthone) 1 mg/0.5 ml and 10 mg/ml Inj; 10 mg Tab; Kenadion. (Phytomenadione).

- Not effective in hypoprothrombinemia due to severe liver disease and hereditary hypoprothrombinemia.

Miscellaneous Drugs

1. Alprazolam

Use: Treatment of anxiety and panic disorder.

Dosage: PO: 0.005-0.02 mg/kg/dose 3 times/day.

Brands: 0.25 and 0.5 mg Tab; Alprax, Alzolam, Restyl.

- Abrupt discontinuation may result in withdrawal symptoms. Safety not established in < 18 yr.

2. Atorvastatin

Use: Hypercholesterolemia in patient not responding adequately to diet and other measures.

Dosage: PO: Children > 6 yr: 10-80 mg/day once daily. Adjust dose as per lipid levels.

Brands: 10 and 20 mg Tab; Astin, Astorlip, Atorva, Lilo.

- May cause hepatitis, pancreatitis, gastritis, hyperglycemia.

3. Azathioprine

Use: Adjunct with other agents in prevention of transplant rejection, as immunosuppressant in autoimmune diseases like SLE, nephrotic syndrome.

Dosage: PO, IV

- Transplantation: Initial 2-5 mg/kg/dose once daily and maintenance dose is 1-3 mg/kg/dose once daily.
- Other condition: 1 mg/kg/dose once daily for 6-8 wk.

Brands: 50 mg Tab; Azimune, Azoprine, Immuran. 100 mg/Vial; Immuran.

- If used along with allopurinol reduce dose by 25-33%. Chronic immunosuppression increases risk of lymphoma and skin cancers. May cause irreversible bone marrow suppression.

4. Caffeine Citrate

Use: Idiopathic apnea of prematurity.

Dosage : Neonate: IV

- Loading dose: 10-20 mg/kg (5-10 mg/kg as caffeine base).
- Maintenance dose: 5 mg/kg/day (2.5 mg/kg/day as caffeine base) once daily, started 24 hr after the loading dose. Adjust maintenance dose based on patient response.

Brands : 25 mg/ml Inj; Cafirate, Cafcit.

- Give loading dose over at least 30 min and maintenance dose over 10 min diluted in D 5%.

5. Charcoal

Use: Emergency treatment in poisoning by certain drugs and chemicals, in overdoses of certain drugs to enhance their excretion (phenobarbitol, quinine, carbamazepine).

Dosage: 1-2 g/kg or 5-10 times the weight of the ingested poison, may be given q 4-6 hr.

Brands: 400 mg activated charcoal + 80 mg Simethicone: Tab; Distenil.

- If given along with milk, ice cream may reduce its effectiveness.
- May cause vomiting, constipation, black stools, intestinal obstruction.

6. Chlorhexidine

Use: As antibacterial, hand and dental rinse, surgical scrub.

Dosage: Oral rinse: 5-15 ml twice daily. Cleanser: 5 ml per scrub or handwash.

Brands: 0.2% mouth wash; Clohex, Hexitrin, Rexidin. 4% solution; 0.2% Lotion; Harifresh. 0.5% solution; Microgard.

- Avoid eating for 2-3 hr after oral rinse. May cause skin and tongue irritation, staining of oral surface.

7. Cholestyramine Resin

Use: Hypercholesterolemia, pruritis associated with elevated bile acids, diarrhea associated with excess fecal bile acids.

Dosage: PO: 240 mg/kg/day divided q 8 hr.

Brands: 4 gm sachet; Questran.

- Avoid in biliary obstruction or atresia. For long-term therapy, multivitamin, iron and folic acid is recommended in addition. May cause constipation, malabsorption of fat soluble vitamins, hyperchloremic acidosis.

8. Colostrum

Use: As immune modulator to provide antibodies.

Dosage: PO: 44 mg/kg/day in divided doses.

Brands: 90 gm pack; Pedimune powder.

It is a premilk fluid produced in the first 48 hr after giving birth.

9. Dextromethorphan

Use: Symptomatic relief in nonproductive cough.

Dosage: 2-6 yr: 2.5-7.5 mg q 8 hr (Max: 30 mg/day).

7-12 yr: 5-10 mg q 8 hr (Max: 60 mg/day).

> 12 yr: 10-30 mg q 8 hr (Max: 120 mg/day).

Brands: 10 mg Tab; 30 mg/5 ml Syp; Lastuss. 10 mg/5 ml Syp; Suppressa.

- May cause drowsiness, dizziness, nausea.

10. Doxapram

Use: Treatment of apnea of prematurity not responding to theophylline therapy.

Dosage: Initial dose of 2.5 mg/kg followed by continuous infusion of 1 mg/kg/hr (Max: 2.5 mg/kg/hr).

Brands: 20 mg/ml Inj; Caropram.

- C/I in seizures, cerebral edema, respiratory problem. May cause HT, tachycardia, CNS stimulation.

11. Glucagon

Use: Hypoglycemia, beta-blocker overdosage.

Dosage: IV, IM, SC

- Neonates, infants and children ≤ 20 kg: 0.02-0.03 mg/kg or 0.5 mg.
- Children > 20 kg: 1 mg.

Brands: 1 mg/ml Vial; Glucagon novo.

12. Glycopyrrolate

Use: Inhibition of ssalivation and excessive secretions of the respiratory tract, reversal of muscarinic effects of cholinergic agents.

Dosage:

- Control of secretions: PO: 40-100 mcg/kg/dose 3-4 times/day. IM, IV; 4-10 mcg/kg/dose q 3-4 hr.
- Preoperative: IM: 4-5 mcg/kg 30-60 min; before procedure.
- Reversal of muscarinic effects: IV; 0.2 mg for each 1 mg of neostigmine and 5 mg of pyridostigmine administered.

Brands: 0.2 mg/ml Inj; Glyprolate, Pyrolate.

- Infants with Down's syndrome, spastic paralysis or brain damage may be hypersensitive to its effects.

13. Guaifenesin

Use: Symptomatic treatment of cough (expectorant).

Dosage: PO: <2 yr: 12 mg/kg/day in divided doses. 2-5 yr: 50-100 mg/kg/day. > 6y: 100-200 mg q 4 hr.

Brands: Axalin Exp: Guai. 50 mg + Dextromethorphan 5 mg + CPM 2.5 mg + Ammonium chloride 60 mg/5 ml. Codicoff Exp: Guai. 100 mg + Dextromethorphan 10 mg/5 ml. Dilo-BM expectorant: Ambroxol 30 mg + Guaiphenesin 30 mg + Terbutaline 1.25 mg/5 ml.

- Administer with large quantity of fluid to ensure proper action.

14. Insulin

Use: Treatment of insulin dependent diabetes mellitus, hyperkalemia, diabetic ketoacidosis.

Dosage: Only regular insulin can be given IV or IM.

- Neonates: Regular insulin 0.01-0.1 unit/kg/hr continuous infusion or 0.1-0.2 unit/kg q 6-12 hr SC.

- Children: 0.5-1 unit/kg/day in divided doses SC, adjust dose as per blood glucose level.
- Diabetic ketoacidosis: IV; Loading dose of 0.1 unit/kg followed by maintenance continuous infusion of 0.1 unit/kg/hr, adjust as per blood glucose level.
- Hyperkalemia: (Treat with IV calcium and sodium bicarbonate before giving insulin). Add 1 unit of regular insulin in 5 gm of dextrose solution, infuse at a rate of 0.5-1 gm/kg over 30 min followed by 0.1 unit/kg SC or IV.

Brands: 40 unit/ml (neutral) Inj; Actrapid. 40 and 100 unit/ml (isophane) Inj; Human Insulatard. 30% soluble + 70% isophane insulin 40 unit/ml Inj; Huminsulin 30:70, Humstard 30:70. 50% soluble + 50% isophane insulin 40 and 100 unit/ml Inj; Huminsulin 50:50.

- May cause hypoglycemia leading to palpitation, pallor, fatigue, confusion, nausea, numbness of mouth, tremor and hypokalemia. Do not change brand once the blood glucose level is regulated.
- Flush the tubing with 25 ml of insulin solution before begining the infusion to reduce insulin loss due to adsorption.

15. Ketamine

Use: Anesthesia for short procedure.

Dosage: Give half an hour before procedure. IM; 3-7 mg/kg. IV; 0.5 -2 mg/kg. Continuous infusion; 5-20 mcg/kg/min.

Brands: 10 and 50 mg/ml Inj; ketalar, ketam, ketmin.

- Contraindicated in raised ICT, HT, CHF, psychotic disorders. Used in combination with anticholinergic agents to decrease salivation.

16. Loperamide

Use: Short-term use for symptomatic relief in noninfective acute and chronic diarrhea.

Dosage: PO; 2-5 yr: 1 mg TDS. 6-8 yr: 2 mg BD. 8-12 yr: 2 mg TDS.

Brands: 2 mg Tab; Andial, Imodium, Ridol. 1 mg/5 ml Syp; Andial.

- May cause toxic megacolon and paralytic ileus.

17. Mupirocin

Use: Impetigo, folliculitis, furunculosis, minor wounds, burns caused by *S. aureus* and *S. pyogenes*. Used intranasal to eradicate *S. aureus* carriers.

Dosage: Apply cream or ointment 2-3 times/day for 5-14 days.

Brands: 2% Cream; Bactroban, Mupinova, 2% Oint; Bactroban, Mupirax, T-Bact.

18. Pancreatin

Use: Pancreatic insufficiency.

Dosage: Depends upon patient need. Varies from 5000 to 10,000 units. Swallow tablet whole. Take with a meal or snack.

Brands: Pancreatin 175 mg + Simethicone 50 mg + Charcoal 50 mg; Tab; Medizyme. Pancreatin 192 mg + Bile constituents 25 mg + Dimethicon 40 mg; Tab; B-zyme.

- Inadequate dosing may lead to steatorrhea and overdoses to impaction.

19. Piracetam

Use: Adjunct trerapy in cerebral vascular accidents and cerebral insufficiencies; mental retardation; enhance memory and learning.

Dosage: PO: 50 mg/kg/day in 3 divided doses (Max: 400 mg/dose).

Brands: 500 mg/5 ml Syp; 400 and 800 mg Tab; Ceretam, Nootropil, Sumocetam.

- May cause epigastric distress, CNS stimulation, excitement, sleep disturbance.

20. Prostaglandin E_1

Use: To maintain patency of ductus in ductus dependent congenital heart diseases.

Dosage: 0.05-0.1 mcg/kg/min by continuous infusion. Maintenance dose is 0.01 mcg/kg/min.

Brands: 500 mcg/ml Inj; Alpostin, Prostin VR.

21. Racecadotril

Use: Symptomatic relief in diarrhea.

Dosage: PO: 1.5 mg/kg 3 times/day.

Brands: 100 mg Cap; 10 and 30 mg sachet; Racedot, Raceloc, Zedott.

22. Saccharomyces Boulardi

Use: Acute infectious/antibiotic induced diarrhea, irritable bowel syndrome, diarrhea in tube fed infants.

Dosage: PO: 250-500 mg/day for 5-7 days in single or two divided doses.

Brands: Each lyophelized sachet contain 282.5 mg of *S.boulardi* equivalent to 250 mg of yeast; Solib, Stibs.

- Generally safe in normal, previously healthy infants and children but should be avoided in very ill and immuno-compromised individuals.

23. Selenium Sulfide

Use: Seborrheic dermatitis, tinea versicolor, dandruff.

Dosage: Topical in > 2 yr:

- Dandruff, Seborrhea: Apply twice weekly for 2 wk then once weekly for 4 wk. Apply and leave for 5-10 min and then rinse.
- Tinea versicolor: Apply and leave for 30 min and then rinse.

Brands: 2.5% liquid; Selsun, Seldan.

- Avoid contact with eyes and inflamed skin.

24. Sildenafil

Use: Pulmonary hypertension (limited data available).

Dosage: PO

Neonate : 0.3-1 mg/kg/dose q 8-12 hr.

Infant and children: 0.25-0.5 mg/kg/dose q 8 hr.

Brands: 25, 50 mg Tab; Alsigra, Progra, Silagra.

- Use with caution in sepsis, hepatic and renal problems.

25. Simethicone (Activated Dimethicone)

Use: Relieves flatulance, functional gastric bloating, post-operative gas pain.

Dosage: PO; < 2 yr: 20 mg/dose q 4-6 hr; 2-12 yr 40 mg/dose q 6 hr. > 12 yr: 40-120 mg q 6 hr.

Brands: 40 mg/ml Drops; Dimol, Siflat. 40 mg Tab; Dimol. Simethicone 80 mg + Charcoal 400 mg Tab; Gasnil.

26. Sucrose Solution

Use: As analgesic in preterm and term infants.

Dosage: PO

Preterm: <28 wk; 0.2 ml. 28-32 wk; 0.2-2 ml. >32 wk; 2 ml.

Term: 1.5-2 ml.

- Give the required dose over 1-2 min; dose may be repeated once if required. Analgesic effect may last for up to 8 min; wait for 2 min before starting procedure.

27. Surfactant (Bovine)

Use: Prophylaxis and treatment of RDS in premature neonates.

Dosage:

- Prophylactic therapy: 4ml/kg/dose intratracheally as soon as possible; up to 4 doses can be given at 6 hr interval during the first 48 hr of life.
- Rescue therapy: 4ml/kg/dose intratracheally, immediately following the diagnosis of RDS. May repeat 4 dose as needed at 6 hr interval.

Brands: Suspension for inhalation,; 25 mg/ml; Survanta.

Method of administration: Suction infant prior to administration. Give via a 5 f feeding tube. Each dose is divided into four 1 ml/kg aliquots; administer 1 ml/kg in each of four different positions over 2-3 sec.

- May cause bradycardia, pallor, hypotension, apnea, pulmonary air leak, etc.

28. Tacrolimus

Use: As immunosuppressant in organ transplant, topically for severe atopic dermatitis.

Dosage: Children: PO; 0.2 mg/kg q 12 hr Topical; Apply 0.02% oint locally twice.

Brands: 1 and 5 mg Tab; Crolium. 0.5, 1 and 5 mg Cap; Tacromus. 0.02% Oint; Tacroderm, Tacrovate.

29. Tinocardia

Promote leukocytosis with prominant effect on neutrophils and also enhances phagocytic capacity.

Use: Adjuvant in chronic illness (recurrent tonsilitis, chronic otitis media, tuberculosis, bronchial asthma, etc.)

Dosage: PO: 100 mg thrice daily in children > 3 yr.

Brands: 100 and 500 mg Tab; 200 mg/5 ml Syp; Immumod.

30. Ursodeoxycholic Acid

Use: Prevention and dissolution of small cholesterol gallstones, cholestatic conditions like primary biliary cirrhosis.

Dosage: PO; 10-15 mg/kg/day in 1-2 divided doses.

Brands: 150 and 300 mg Tab; Udihep, Udiliv, Urso. 75 mg Tab; Actibile.

- C/I: Calcified cholesterol stones, gallstones > 15 mm, hepatic impairment, biliary obstruction.

Appendices

Table 1: Equipment for resuscitation in various age group

Equipment	*Premature*	*NB*	*6 mth*	*1-2 yr*	*5 yr*	*8-10 yr*
Chest tubes	10-14 F	12-18 F	14-20 F	14-24 F	20-32 F	28-38 F
N-G tubes	5 feeding	5-8 feeding	8 F	10F	10-12 F	14-18 F
Foley's	5 feeding	5-8 feeding	8 F	10 F	10-12F	12F
O_2 masks	NB	NB	Pediatric	Pediatric	Pediatric	Adult
ET tubes	2.5 to 3.0	3 to 3.5	3.5 to 4.5	4.0 to 4.5	5.0 to 5.5	5.5 to 6.5
Arm boards	6 inch	6 inch	6-8 inch	8 inch	8-15 inch	15 inch
BP cuffs	NB	NB	Infant or	Child	Child	Child or adult
Laryngo-scope blade	0	1	child 1	1	2	Adult

Table 2: Fasting guidelines for sedation or anesthesia

Food	*Hours of fasting required*
Clear liquids	2
Breast milk	2-4
Formula or light meal (No fat)	6
Full meal	8

Table 3: Sedation techniques suggested for children

Procedure	*Sedation and analgesia technique*
Lumbar puncture	* Local anesthesia with minimal/moderate sedation. Local anesthetics: Lidocaine/EMLA Cream. Minimal/Moderate Sedation: Midazolam or sometimes * Deep sedation: Fentanyl/Midazolam or Ketamine
Painful procedures: Biopsy of liver/kidney, bone marrow aspiration. Fracture reduction. Drainage of abscess. Burn debridement.	Deep sedation combined with local anesthesia: As above
Laceration repair	Local anesthesia with minimal/moderate/deep sedation: As above
IV catheter placement	Local anesthesia and sometimes minimal/moderate sedation: As above

Table 4: Drip calculations

Drug	*Dose*	*Calculation*	*Rate and dose*
Dobutamine	5-20 mcg/kg/min	6 × body wt (kg) is the mg added to make 100 ml	1 mL/hr = 1 mcg/kg/min
Dopamine	2-20 mcg/kg/min	6 × body wt (kg) is the mg added to make 100 mL	1mL/hr =1 mcg/kg/min
Epinephrine	0.1-1 mcg/kg/min	0.6 × body wt (kg) is the mg added to make 100 mL	1 mL/hr =0.1 mcg/kg/min
Isoproterenol	0.1-1 mcg/kg/min	0.6 × body wt (kg) is the mg added to make 100 mL	1mL/hr =0.1 mcg/kg/min
Lidocaine	20-50 mcg/kg/min	120 mg in 100 mL of D-5%	1 mL/kg/hr =20 mcg/kg/min

- Patients ≤ 40 kg and those requiring fluid restriction may need more concentrated solutions in order to deliver less fluid per hour. In those cases or as an alternative to the listed calculations above, use the following equation:

$$\text{Rate (mL/hr)} = \frac{\text{Dose}\left(\text{mcg/kg/min} \times \text{weight}\left(\text{kg}\right) \times 60\,\text{min/h}\right)}{\text{Concentration}\left(\text{mcg/mL}\right)}$$

Table 5: Treatment for drug extravasation

Medication extravasated	*Cold/Warm pack*	*Treatment*
Ischemic inducer:		
Dobutamine Dopamine Epinephrine Norepinephrine Phenyleprine Vasopressin	None	Phentolamine: Mix 5 mg with 9 mL of NS. Inject a small amount of this solution into extravasated area. Blanching should reverse immediately. Monitor site, if blanching recur, additional injections of phentolamine may be needed.
Miscellaneous agents:		
Aminophylline Calcium salts Dextrose Mannitol Phenytoin Contrast media Sodium bicarbonate Sodium chloride Tetracycline	Cold	Hyaluronidase: Add 1 mL NS to 150 units to make 15 units/mL. Administer 0.2 mL SC or intradermally into the extravasated site.

Table 6: Estimation of total body surface area of burn involvement (% by site and age)

Site	*0-1 yr*	*1-4 yr*	*5-9 yr*	*10-14 yr*	*15 yr*	*Adult*
Head	9.5	8.5	6.5	5.5	4.5	3.5
Neck	0.5	0.5	0.5	0.5	0.5	0.5
Trunk	13	13	13	13	13	13
Upper arm	2	2	2	2	2	2
Forearm	1.5	1.5	1.5	1.5	1.5	1.5
Hand	1.5	1.5	1.5	1.5	1.5	1.5
Perineum	1	1	1	1	1	1
Buttock	2.5	2.5	2.5	2.5	2.5	2.5
Thigh	2.75	3.25	4	4.25	4.5	4.75
Leg	2.5	2.5	2.75	3.00	3.25	3.5
Foot	1.75	1.75	1.75	1.75	1.75	1.75

1. The total body surface area of burn involvement is determined by the sum of the percentages of each site.
2. Applicable to second and third degree burns.
3. Percentage for each site is only for a single extremity with anterior or posterior involvement. Percentage should be doubled if both anterior and posterior involvement of a single extremity.

Parkland Fluid Replacement Formula

A guideline for replacement of deficits and ongoing losses (Note: For infants, maintenance fluids may need to be added to this): Administer 4 ml/kg/% burn of Ringer's lactate (glucose may be added but beware of stress hyperglycemia) over the first 24 hours; half of this total is given over the first 8 hours calculated from the time of injury; the remaining half is given over the next 16 hours. The second 24 hours fluid requirements average 50 to 75% of first day's requirements. Concentrations and rates best determined by monitoring weight, serum electrolytes, urine output, NG losses, etc.

Colloid may be added after 18-24 hours (1g/kg/day of albumin) to maintain serum albumin> 2 g/100 ml.

Potassium is generally withheld for the first 48 hours due to the large amount of potassium that is released from damaged tissues. To manage serum electrolytes, monitor urine electrolytes twice weekly and replace calculated urine losses.

Table 7: Average weight and surface area

Age	*Average weight (kg)*[1]	*Approximate surface area (m^2)*
Weeks gestation		
26	0.9-1	0.1
30	1.3-1.5	0.12
32	1.6-2	0.15
38	2.9-3	0.2
40 (term infant at birth)	3.1-4	0.25
Months		
3	5	0.29
6	7	0.38
9	8	0.42
Years		
1	10	0.49
2	12	0.55
3	15	0.64
4	17	0.74
5	18	0.76
6	20	0.82
7	23	0.90
8	25	0.95
9	28	1.06
10	33	1.18
11	35	1.23
12	40	1.34
Adult	70	1.73

[1]Weights from age 3 months and over are rounded off to the nearest kilogram.

Table 8: Calculation of surface are from weight

Weight range	*Surface area*
1-5 kg	(0.05 x weight) + 0.05
6-10 kg	(0.04 x weight) + 0.10
11-20 kg	(0.04 x weight) + 0.20
21-40 kg	(0.02 x weight) + 0.40

In infants and children risk of fluid overload is always a consideration when giving IV medications. Following table provides maximum concentrations and the maximum rate at which the medications can be given.

Table 9: Quick reference chart for IV medication

Drug	*Maximum concentration*	*Maximum rate*
Acyclovir	10 mg/ml	Give over 1hr
Adenosine	3 mg/ml	Give over 1-2 sec
Amikacin	10 mg/ml	Give over 30 min
Aminophylline	25 mg/ml	25 mg/min
Amphotericin-B	0.1 mg/ml	Give over 2-6 hr
Ampicillin	100 mg/ml	10 mg/kg/min
Atropine	1 mg/ml	Give over 1 min
Cal gluconate	100 mg/ml	100 mg/min
Cefazolin	20 mg/ml	Give over 10-60 min
Cefepime	160 mg/ml	Give over 30 min
Cefotaxime	60 mg/ml	Give over 10-30 min
Ceftazidime	40 mg/ml	Give over 10-30 min

Ceftriaxone	40 mg/ml	Give over 10-30 min
Cefuroxine	30 mg/ml	Give over 15-60 min
Dexamethasone	10 mg/ml	Doses <10 mg give over 1-4 min
		Doses>10 mg give over 10-20 min
Diazepam	5 mg/ml	2 mg/min
Digoxin	100 mcg/ml	Give over 5 min
Fosphenytoin	25 mg/ml	3 mg/kg/min
Gentamicin	40 mg/ml	Give over 30 min
Hydrocortisone	5 mg/ml	Give over 20-30 min
Ketamine	2 mg/ml	0.5 mg/kg/min
Lorazepam	4 mg/ml	0.05 mg/kg over 2-5 min
Meropenem	50 mg/ml	Give over 15-30 min
Methylprednisolone	2.5 mg/ml	Give over 20-60 min
Metoclopramide	5 mg/ml	Give over 1-2 min
Metronidazole	8 mg/ml	Give over 1 hr
Midazolam	5 mg/ml	Give over 20-30 sec
		(5 min in neonates)
Ondansetron	2 mg/ml	Give over 2-15 min
Phenobarbital	130 mg/ml	2 mg/kg/min
Phenytoin	50 mg/ml	3 mg/kg/min
Piperacillin	20 mg/ml	Give over 20-30 min
Ranitidine	2.5 mg/ml	10 mg/min
Vancomycin	5 mg/ml	Give over 60 min

Appendix–2: Administering Medicines to Children

Medication administration to a pediatric population is a very difficult job. One child may take the particular product and form of medicine easily but the another child may not accept the same.

Nurses and residents should learn following points for administering medicines to children.

- In children oral route is preferred over parenteral. If not accepting one type of oral form try another form.
- Special equipments are available for administering oral medicines, e.g. measuring cups and spoons, oral syringes, oral droppers, cylindrical dosing spoons. Parents should be taught to use caliberated devices provided with product rather then using household utensils.
- In young children, it is better to give part of the dose at a time into the side of the cheek away from the bitter taste buds at the back of the tongue.
- Prefer liquid preparation in children < 5 yr of age and in > 5 yr of age give dispersible or chewable form of medicines.
- Maximum volume allowed in parenteral administration is; subcutaneous = 0.5, intradermal = 0.01-1 ml, intramuscular 0.5-1 ml, intravenous = use smallest recommended diluent for dilution.
- For IM prefer shorter (½-1 inch) and smaller (23-30 G) needles.
- Give IV via pediatric drip set with microdrip chamber.

- For ID route use 1 ml syringes caliberated in 0.01 ml units 26-27 G needles.
- For SC route use 1 ml syringes caliberated in 40 or 80 units and 25 G needles.
- Always compare the ordered dose with the recommended formulary dose based on a child's weight or BSA. Ordered dose is considered safe if it is less then or equal to the recommended formulary dose.

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